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Perspective

Medical Profiles

Major General James B. Peake

The medical readiness and deployability of individual soldiers is a key concern for commanders at all levels. Commanders naturally desire to deploy units at full strength. Unfortunately, soldiers will stay behind because of a variety of reasons including unresolved family or personal issues, administrative/ legal concerns, and medical problems. This latter category of medical nondeployability can account for a significant percent of the average unit's strength and, consequently, represents a major challenge to a commander's ability to accomplish the mission.

The Army Medical Department (AMEDD) has the responsibility for enabling commanders to maintain a fit and healthy force. One of the key tools used by medical providers to communicate an individual soldier's medical status and fitness for duty is the "medical profile." This document (the familiar DA Form 3349) is used by physicians, physician assistants, and other healthcare providers to document the physical limitations imposed on a soldier because of a medical condition. Because this document goes directly to a soldier's chain of command and greatly influences decisions on duty and deployability, accuracy, timeliness, and above all-relevance, is crucial.

The AMEDD Center and School's Academy of Health Sciences, through the Department of Medical Science, is developing a website to assist and guide healthcare provides in completing a medical profile. The site will provide specific guidance on completing the profile and give detailed examples using actual medical conditions. The site will also provide hints on developing effective, medically-appropriate yet least-restrictive limitations based on typical Army jobs and duties. This latter feature will arm profiling physicians and others with the tools needed to write the best possible medical profiles.

This issue of the AMEDD Journal is dedicated to the fitness and readiness of our soldiers:

- *The MAMC Improvement Award Program.* Describes an incentive program to reward organizational groups within a military hospital for improving efficiency, quality of care, resource management, and other key indicators. The overall goal, of course, is to improve the operation and effectiveness of the hospital in preventing disease and caring for patients.

- *Madigan Research Day Proceedings.* Shows the diversity and depth of ongoing scholarly activity at just one of the Army's Medical Centers.

- *Women's Healthcare Initiative Research Center.* Women's health is emerging as a separate specialized field within medicine. This article describes the consolidation of all Women's Health initiatives into one area at MAMC to allow the best resource-sharing potential, clinically and administratively.

- *The EBC: Its Use in the Military Health System.* The military's healthcare system strives to meet the challenge of maintaining readiness while providing high-quality peacetime healthcare. One of the ways the system is accomplishing this reengineering is through the use of enrollment based capitation (EBC). This article discusses EBC and how it can improve the financial efficiency and effectiveness of healthcare delivery.

- *The Cardiovascular Specialist: Skills for the Future.* Highlights the training and utilization of one of the AMEDD's most highly skilled enlisted specialties. Cardiovascular specialists form an integral part of the cardiology team, evaluating and treating a wide range of diseases.

- *A Comparison of MMPI Profiles: Combat Zone vs Stateside Cohorts.* Examines the psychological and personality profiles of soldiers in and out of battle. Information such as this can one day help prevent the scourge of combat stress.

- *The Economic Efficiency Factor and its Use in Service Line Evaluation.* Provides an in-depth description of a resource and finance tool for quantitative evaluation of health services.

These articles chronicle the breadth of excellence required to run an integrated military health system; administrative link of healthcare to military duty; to resource management; to clinical technique. All are a part of medical readiness.

The EEF and its Use in Service Line Evaluation

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The Military Health System (MHS) is under enormous political and economic pressure to reduce inefficiency in the Medical Treatment Facilities (MTFs). To best meet this pressure, the leadership of the MHS must perform more accurate cost accounting and develop methods to measure performance under the managed care capitation model. This article will discuss the authors' development of a financial tool designed to compare and evaluate service line management and to identify the Medicare level of effort (LOE) by service line. This financial tool is used to calculate the efficiency metric known as the Economic Efficiency Factor (EEF).The EEF provides a numerical factor that represents the financial level of efficiency at which the MTF or service line performed over a defined period of time. This factor has potential use as a benchmark. By using this tool, individual MTFs can compare their detailed financial, operational, and clinical performance with other like-sized facilities or peer groups. Benchmarks may be established for each service line, allowing commanders to target operational and clinical areas for improvement. This process allows the identification, establishment, and measurement of service line performance goals. Using the EEF metric, commanders may identify the least efficient service lines and focus their efforts on obtaining the greatest "bang for the buck." Through the judicious use of the tool, MTF leaders can achieve significant improvement in their facilities' overall financial efficiency. Future studies may focus on the correlation of improving access to care and the quality of care rendered with financial efficiency. As a postscript to this article, the authors have been notified that the United States Army Medical Command directed that all Army MTF utilize a slightly modified version of the EEF as part of a larger analysis and provide their responses no later than 1 Jul 98. Additionally, the authors were presented with the Researchers of the Year Award by the American Society of Military Comptrollers in May 1998.

Introduction

Inefficiency is a term that has been used to describe excess hospital occupied bed days, inappropriate admissions, and excessive administrative overhead in the MHS when compared with civilian healthcare institutions. The MHS is under enormous political and economic pressure to reduce "inefficiency" in the MTFs. The driver of this tremendous pressure is the high cost of operating military hospitals. According to the Government Accounting Office (GAO) this cost totaled $15 billion in 1997 and represented 6% of the total budget allocated to the Department of Defense (DOD).[1] Several major factors leading to the political interest have been the general lack of fiscal accountability of the Defense Health Program (DHP), poor cost accounting, and the general lack of benchmarking exhibited by all Armed Service Health Programs. The critical issue for the MHS is the need to perform more accurate cost accounting and find methods to measure performance under the managed care capitation model.

Capitation is the prepayment for services on a per member, per month basis that may be varied based on factors such as age or gender of the enrolled population.[2] Capitation is further explained as, "the shifting of risk, and therefore medical management responsibility to physicians in exchange for a flat, per member payment, usually in monthly allotments."[3]

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This article will discuss the authors' development of a financial tool designed to allow each MTF to calculate, compare, and evaluate service line management, and to identify the Medicare LOE by service line. The Medicare LOE is the amount of MTF healthcare expenditures on eligible beneficiaries who are 65 years of age or older.

Purpose

The purpose of this project was to create a financial tool which would: (1) provide a method to compare and evaluate service line management; and (2) provide a financial tool to identify the Medicare LOE by service line and attempt to show the LOE contribution to business practices.

Major Robert Goodman developed a metric that met this requirement. The financial tool measures the value of patients seen and treated in MTF ambulatory and inpatient settings, in terms of dollars, against MTF costs of performing the care. The metric is derived from the financial tool by comparing the value of care against the MTF cost of performing the care. This single numerical factor represents the financial level of efficiency at which the MTF or service line performed over a defined period of time. Use of this financial tool and the efficiency metric as a decision support tool should provoke additional research to identify other influences on MTF financial efficiency. The goal of creating this tool is to assist commanders in focusing their efforts on areas where they will most likely obtain significant improvement in their facility's overall efficiency. The financial tool was built to allow targeted analysis and help the MHS reap cost reductions from the least efficient MTFs, thus obtaining the greatest "bang for the buck." The metric developed by the authors (henceforth referred to as the EEF) is the main focus of this project.

Background

A significant factor that intensified the political scrutiny of the MHS was the massive growth of the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). The costs of operating the CHAMPUS program became unmanageable because those with authorization capability, namely the MTFs, were not financially accountable. The MTFs could shift patient care out to the civilian sector with no concern about the total use or cost. The CHAMPUS became a dysfunctional system of military healthcare financing which confounded efforts to control cost growth, created issues concerning military physician quality/pay, and did not hold the three services accountable for their own cost shifting behavior until 1988.[4]

During the mid and late 1980s, the Medical Departments of the Services successfully sought additional resources to assist in recapturing CHAMPUS workload in an effort to provide cost savings to the government. Additional resources were provided, and physician bonus pay was increased–yet CHAMPUS costs continued to grow at an increasing rate. Compounding this demand for additional resources, which were intended to save CHAMPUS expenditures, was the continued cost shifting of CHAMPUS and Medicare eligible care out of the MTFs at no penalty. Braendel notes that the DOD paid the CHAMPUS bill in total until 1987.[5] Prior to 1988, the Secretary of Defense was forced to regularly return to Congress at year-end close, with a request for additional funds to meet unpaid, outstanding CHAMPUS bills.

Two important changes occurred during 1988 that provided sufficient motivation for DODs request that DHP execute better fiscal accountability. First, Congress directed that the individual services be responsible for their own CHAMPUS expenditures. Second, CHAMPUS payments made to hospitals were changed from billed charges to diagnostic related groups (DRGs).[6] The change shifted the risk from the Secretary of Defense to each of the three services. The leadership of the three medical departments became significantly more accountable for their service generated CHAMPUS expenditures.

In Feb 97, the GAO issued a report on the DHP. The report indicates that the DOD (Health Affairs [HA]) program objective memorandum overestimated utilization management savings and did not factor in increased operating costs for new technology and medical intensity. The GAO estimate for the required medical reprogramming is $8.4 billion from FY 98 to 03.[7]

To provide more financially efficient and effective care to beneficiaries, in the face of ever-shrinking resources, requires many changes in the way the MHS attempts to execute its mission. One of the most critical changes is the use of enrollment based capitation (EBC) in the MHS. The EBC is intended to serve as the cornerstone of MHS efforts to compete for healthcare dollars, in light of the emerging national healthcare reform movement. Many powerful individuals have recognized that the need to improve efficiency in the healthcare marketplace includes the MHS.

To facilitate these efforts at improving efficiency and assist in the development of appropriate capitation rates, MTFs are beginning to utilize activity based costing (ABC). "This technique identifies the relationship between an activity and the resources

needed to complete it and then assigns costs to those resources consumed by the activity."[8] The use of ABC assists the MTF through facilitating the analysis to realign resources. The realignment of resources is intended to reduce "inefficiencies" and improve access to enrolled beneficiaries. To meet the challenge of managing an enrolled population, MTF commanders must fully understand the total costs of providing care to their specific enrolled population. "The MTF commanders will be empowered through EBC to provide high quality, appropriate, and cost-effective healthcare to their beneficiaries."[9]

This climate of extreme pressure to make the MHS accountable has driven senior leaders to search for a method to measure efficiency in the capitated managed care environment. The most fundamental element for measuring efficiency remains understanding the operational costs and comparing them with output. "In the 21st century, the first-line healthcare organization will control cost and quality as one of its central functions."[10] In order to accomplish this, the MHS requires an accurate financial efficiency metric to complement the EBC scorecard and allow senior leaders to compare MTFs to each other and to similar civilian facilities or benchmarks. This led the group to develop the financial tool and the EEF.

Literature Review

The level of efficiency is the relationship between operational costs and the output, service, or performance. This has long been a problem in the government. Vann notes that a hunger exists in governmental operations for accurate and easy-to-understand financial data.[11] He notes that government services are still tied to the obsolescent Planning, Programming, Budgeting, and Execution System implemented in 1962, which typically accounts for costs at the major activity level, such as civilian pay or supply purchases. The challenge is relating costs appropriately with the specific services provided.

To improve performance, managers and leaders must accept responsibility for meeting the three tests of managerial accounting. These three tests include the concepts of profitability, control, and improvement. The responsibility of the finance system is to produce the data for all three tests. The normal process in well-managed organizations is to develop forecasts of each test, refine these into expectations that are incorporated into the budget process, and then monitor the actual performance against expectations. The third test is used to establish goals for continuous improvement.[12]

Costs are forecast by historic unit costs with independent assessment of trends in prices or purchased goods and services. Well-managed organizations recognize danger signals or trends, and make the necessary adjustments. Poorly managed organizations ignore the financial planning step, or convince themselves that miracles will happen.[13]

Because the incentives have changed so significantly, decisions concerning resourcing require modification. No longer is the focus on inpatient admissions and occupied beds. The effort has been to see more patients in an outpatient or ambulatory setting to reduce the amount of time spent in the hospital environment. Hart and Conners provided a Resourcing Decision Model they use at Naval Hospital, 29 Palms.[14] They ask three basic questions. First, does the proposal make good business sense? Second, does the resourcing decision contribute to readiness? Finally, is it the right thing for the patient? If these can be adequately answered, then the MTF commander can proceed with funding and implementation. Vann advocates switching to the ABC technique that many corporations are starting to use.[15] Ramsey recommended that civilian hospitals convert to ABC to better identify their cost drivers and the cost of outputs.[16] Costs are described in terms of the actions that consume resources. These costs are then attached to the specific consumer products. This relationship allows management to change their approach from broad categories of cost pools (civilian pay, travel, and supplies), to analyze the outcomes of particular activities.

The use of ABC facilitates planning, benchmarking, reimbursement rates, service line costs, and business process reengineering. Ramsey considers ABC critical for healthcare organizations that want to succeed in the managed care environment.[17] Promotion of cost-efficiency that emphasizes continuous quality, maximized resources for product-line management, and focused continuous improvement are the results of ABC use.

The review of the available literature revealed very little documentation of actual financial levels of efficiency relating to military MTFs. A limited amount of related information that deals with general financial efficiencies and physician profiling was obtained. Hadley, Zuckerman, and Iezzoni found that those healthcare reforms and market forces that put financial pressures on hospitals result in cost containment and improved efficiency.[18] Steadily diminishing federal resources coupled with increased levels of scrutiny is the current and future reality for the MHS. The necessary levels of cost control and quality cannot be

achieved without a clear mission, a governing board review of the medical staff, a well-designed structure for making and implementing decisions, a competent planning function, a sound finance system (which includes an efficient cost analysis mechanism), and modern information systems.[19] Hospital leaders must have a means of measuring financial efficiencies as well as mechanisms to identify the variables that have the greatest impact on those efficiencies.

Other studies have attempted to address the critical issue of the healthcare administrators and physicians struggling to blend financial efficiency with quality of care. While quality of care must remain paramount within the military healthcare system, it must also be provided in an efficient manner. One study by Fleming and Boles identified a model that relates the financial health status of an organization (financial integrity) to the quality of care provided by that organization (clinical integrity) within an environment characterized by various forms of risk. The model suggests that both concepts work in concert to determine the corporate destiny (success, bankruptcy, or merger) of the organization.[20]

Other studies whose mutual focus is Graduate Medical Education (GME) lend further support to the move towards ABC. Stoddard et al found that substituting house staff and other healthcare providers to reduce resident staff is actually less expensive.[21] Additionally, Morey et al suggest that optimal cost control could be gained by modifying the Health Care Financing Activity (HCFA) method of offering much higher prospective reimbursements for teaching hospitals and separating hospitals into peer groups that would, in turn, develop "best practices."[22]

Many civilian hospitals are still nonmanaged care-oriented and operate in a for-profit or not-for-profit fashion. Shukla et al recently found that there were no significant differences in measures of efficiency or productivity between for-profit and not-for-profit hospitals in Virginia.[23] The major reason that for-profit hospitals are more "profitable" is that they manage revenue better. To improve this situation for not-for-profit hospitals, ABC would provide the tools needed. Better management of nonrevenue product-lines, like the hospital billing department, could improve efficiency.

Miller discusses the relationship of Medicare costs between facility and physician services.[24] He used a multivariate regression analysis to determine that a 10.0% increase in physician services is associated with a 3.0% rise in facility services. In other words, additional efforts by physicians led to increases in hospital services and revenues. He concluded that efforts to reduce physician services would also reduce facility services in the long run. Conner noted that other factors require review for proper staffing and resourcing.[25] He found that a 1% increase in elderly population requires a 2% increase in staffing. Through utilization of the ABC technique, better accountability from the DOD Medical Centers with GME may be possible.

Data Sources

The MHS uses a cost accounting system known as the Medical Expense Performance Reporting System (MEPRS). The MEPRS accounts for the standard government costs of civilian pay, travel, supplies and equipment, as well as the salaries paid to the military personal assigned to fixed healthcare facilities. The MEPRS compares these costs with an output measured in terms of visits, admissions, dispositions, or occupied bed days.

The MEPRS is divided into several major categories of costs. Direct inpatient (A-account) costs are allocated to each service or department. Direct outpatient (B-account) costs are assigned to individual services and departments. Dental (C-account) costs were not used in this model. Ancillary services such as pharmacy, pathology, radiology, and nutrition care are found in the D-account. Administrative costs from departments and sections such as logistics and patient administration are found in the E-account. The F-account contains an assortment of healthcare related costs. Some cost centers may be valid (Student Expenses – GME). Other costs are not valid for use in the model (Veterinary Services). The final account (G) is for military specific costs such as personnel salaries for deployed individuals. The MEPRS is set up for the related ancillary and administrative costs to be married up with the using inpatient and outpatient services.

Numerous complaints have been leveled against MEPRS because of poor data quality and lack of management oversight. Additionally, MEPRS spreads costs on a percentage or step-down methodology. The MEPRS uses the hospital average for each service or department instead of the actual weighted units produced by individual services. This had led to complaints that while MEPRS compares costs in relation to an output, better and more detailed output data is available through the Retrospective Case-Mix Analysis System (RCMAS).

The MEPRS cost data can also be compared with Relative Weighted Products (RWPs). This RWP is

comparable with the DRG weighted system used by the HCFA. The RCMAS contains data from MTFs about the number of dispositions and the resource intensity of those admissions. The resource intensity is defined by the case mix index (CMI), and can be obtained from the RCMAS by individual admission or service line, such as internal medicine, department, or MTF.

There are three primary sources for data that were utilized for this project: RCMAS, MEPRS, and current standard reimbursement rate, known as the CHAMPUS Maximum Allowable Charge (CMAC), from the Office of CHAMPUS Internet Home Page. The Ambulatory Data System (ADS) will be used in the future for calculating the workload and resource intensity of ambulatory care by service line.

Assumptions

The MHS formerly utilized a perverse method of funding described by Braendel as the Medical Care Composite Unit.[26] The MHS is currently using a modified form of capitation funding designed and implemented by Braendel during FY 92. This change has brought about numerous positive effects. The biggest improvement has been better overall fiscal accountability. In the local settings, inappropriate admissions and excess lengths of stay have been largely eliminated. This indicates that physician behavior has been modified. Some of the MTFs have successfully reaped savings from the physician behavior changes. Many hospitals have closed inpatient wards and some have significantly reduced nursing staffing. However, despite the push towards "managed care," most hospitals have not invested in additional primary care assets. Outpatient access is still a significant problem for the MHS.

The "Medicare Subvention" legislation has been generally viewed with great enthusiasm by senior medical leadership. A common misperception is that this legislation will finally allow the MTFs to recover their costs for treating Medicare eligible military beneficiaries. The reality is that the MHS must meet a LOE (more commonly referred to as the workload already built into the funding base) before any additional funds will be transferred to the DOD (HA) from HCFA.

The interesting dilemma is that while outpatient access remains a significant problem for active duty and their dependents, senior MHS officials note that additional space-available care may be open to increase the access to Medicare eligible beneficiaries. Additionally, the enrolled Medicare beneficiary will be a "covered life." The covered life entails covering all healthcare costs and the enrolled Medicare eligible beneficiary cannot be turned away and "shifted" to HCFA-paid Medicare insurance.

The model was built using several technical assumptions. First, it was assumed that the standardized CHAMPUS CMAC is a sufficient method for calculating the estimated cost avoidance (revenue) for hospital and clinic care. Because this is a standardized rate, it will facilitate comparison across all MTFs. Professional costs and revenue will not be included in this project. Second, clinic visits must reflect access to care. Currently, the MHS counts for clinic visits under two broad categories: outpatient and inpatient. Inpatient clinic visits can easily be used by the MTF to churn workload, but do not increase access to the local users. Therefore, only outpatient visits from the MEPRS reports are used in the model.

Additionally, because the ADS has not been fully adopted by all MTFs, a method for calculating the intensity of the outpatient visits was needed in order to estimate outpatient revenue. Until ADS data can be made readily available, the ambulatory weighted unit (AWU) was selected for the model. The DOD (HA) standardized AWU is already available in the MEPRS and provides a resource intensity factor for each different outpatient clinical service. The model is constructed to accept ADS data when it is available.

Finally, the severity of illness and resource intensity for inpatient care can be sufficiently addressed by the CMI from the RCMAS. This will allow comparisons between clinical services, different hospitals, and patient age groups.

Method and Design

Two ABC models were developed to serve as the basis of comparing MEPRS dollars allocated to a MTFs budget to the potential revenue generated. The third model was developed to evaluate the current DOD (HA) and HCFA projected LOE for Medicare eligible beneficiaries.

The ABC model compares current costing methods used by military MTFs against a calculated output, as measured in terms of revenue estimation. Using MEPRS outpatient data, the product of clinic visits and AWU results in the outpatient RWP for a particular clinic service. The CMAC rate is then applied and the result yields the outpatient revenue for a specific clinic service. However, this revenue in terms of the MHS is more appropriately termed cost avoidance. The inpatient activity costing has the same

theoretical framework except that inpatient RWP is derived by multiplying the number of dispositions by the CMI, obtained from the RCMAS database. Actual data from the inpatient care rendered by service line is reported in dispositions and CMI. Both revenues are consolidated and compared to the total MEPRS cost for individual clinic services. The difference can be evaluated in terms of profit and loss as a measure of efficiency or inefficiency.

Finally, the sum of revenues for each clinic department is divided by the MEPRS cost for the same. This helps lessen the effects of poor or inaccurate reporting by physicians because their time and salaries are spread across the entire service; not just outpatient or inpatient areas.

One concern involving this methodology is the attributable time providers spread unequally between in and out patient care. Physician time and associated military salaries were included in the first model. This accurately expressed MTF costs but did not accurately reflect their cost avoidance. In a managed care environment it is important to compare similar relationships among facilities. Therefore, in order to more accurately compare a military MTF to a civilian hospital, a comparison must be drawn excluding physician salaries. Normally, physicians are not employed by civilian hospitals. They derive payment by billing Medicare or other insurers for the "professional" fees associated with the care rendered.

The last model evaluates Medicare service line cost and LOE. The difference associated with this model was that the inpatient cost for the patients was derived by occupied bed days instead of CMI. The methodology used was similar to that designed by Systems Research and Applications Corp (SRA). The SRA model was more detailed and did not include reimbursement for GME or Outpatient Pharmacy.

Conclusion

With today's dwindling resources and increased focus on the rising cost of healthcare, the MHS faces unprecedented challenges in the execution of its healthcare mission. "An important part of the solution to these problems is a revamped healthcare system where the incentives motivate everyone to pursue, or provide, cost-effective quality healthcare."[27] The EBC provides the MHS with one of the tools required to meet these challenges. The EEF provides the second tool to assist the MHS in improving the financial efficiency and effectiveness with which it delivers healthcare.

The EEF provides a single numerical factor that represents the financial level of efficiency at which the MTF or service line performed over a defined period of time. This factor may be used to build a single number efficiency metric that has potential use as a benchmark. Individual MTFs can compare their detailed financial, operational, and clinical performance with other like-sized facilities or peer groups. Benchmarks may be established for each service line, allowing commanders to target operational and clinical areas for improvement. This will allow the identification, establishment, and measurement of service line performance goals. Utilizing the EEF metric, commanders can identify the least efficient service lines and focus their efforts on obtaining the greatest "bang for the buck." In this way, commanders and administrators can achieve significant improvement in their facilities' overall financial efficiency while maintaining or improving the quality of care they render.

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Correction

In the Book Reviews section of the May-Jun 98 issue of the Journal, the following publication information was inadvertently omitted:

The review of ***"The Thoracic Spine and Rib Cage: Musculoskeletal Evaluation and Treatment"*** by T.W. Flynn, was reprinted from the March, 1998 issue of **Physical Therapy**, page 332, with permission of the American Physical Therapy Association.

The Journal regrets any confusion this omission may have caused.

The Cardiovascular Specialist: Skills for the Future

SFC Roger H. Hillhouse†
SFC Steve Newsome††

Cardiovascular disease (CVD) claims approximately 1 million lives each year in the United States–41.8% of all deaths. According to 1995 estimates, 58,200,000 Americans have one or more forms of CVD: high blood pressure, coronary heart disease, stroke, and rheumatic heart disease.[1] This does not include other types of heart affliction like electrical conduction disorders and congenital heart anomalies. Thirteen million, nine hundred thousand people alive today have a history of heart attack, angina pectoris (chest pain), or both, and about one sixth of all people killed by CVD are under age 65.[2] The active and retired Army population is no exception to these statistics. A cardiology service at an Army Medical Center sees thousands of patients each year.

The cardiology field is highly technical and requires specific skills for procedures in cardiac catheterization and echocardiography (Figure 1). For these reasons, competent cardiovascular technicians are required. A cardiovascular technician is the doctor's eyes, ears, and hands in the cardiovascular lab. They must be able to react quickly and think fast. With the evolution of the cardiovascular specialty and because of the high number of patients with CVD, the cardiovascular technician is an essential and vital asset to the Army healthcare team (Figure 2).

Fig 1. Cardiovascular technician preparing for a heart catheterization.

Fig 2. Physician and technician performing a heart catheterization.

The Army Cardiovascular Specialist performs diagnostic examinations at the request or direction of a physician. These procedures may be found in, but not limited to, the following general settings: (1) invasive cardiovascular laboratories, including cardiac catheterization and electrophysiology laboratories; and (2) noninvasive cardiovascular laboratories, including echocardiography, exercise stress test, and electrocardiography laboratories. The Cardiovascular Catheterization Laboratory is one of the most unique medical settings in existence today. The goal of the

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cardiovascular diagnostic exam and intervention is to obtain valid data (hemodynamic and radiologic) and accomplish indicated interventional procedures, while maintaining maximum patient safety and comfort. In addition to the physician, the cardiac catheterization lab must have the combination of three skills to perform most procedures: nursing, radiological, and cardiovascular. In the Army setting, you will find that all three of these skills can be accomplished by the 300-Y6 Cardiovascular Specialist. The Cardiovascular Specialist is trained in all aspects of catheterization lab examinations and interventions including anatomy and physiology, pathology, pharmacology, principles and practice of radiology, optimal angiographic acquisition and film development, and technical acquisition, assessment, and computation of hemodynamic data.

The field of cardiovascular technology itself is expanding in an explosive manner. New interventions are continually evaluated, released, and revised. A competent cardiovascular professional must maintain an active educational program to remain informed about current modifications and advances in procedures. Complicated equipment is frequently used in "niche" situations in the lab. Much of this equipment is not used on a recurring basis; therefore it is difficult to maintain individual operational competence. The technical equipment utilized in the modern lab provides a continual challenge to maintain and troubleshoot. No school prepares its students completely for this vast array of "intellectual and emotional opportunities."[3] Learning is always ongoing for the Cardiovascular Specialist.

In the cardiac catheterization laboratory, not only is the equipment complex, but patients are often unstable. Staff in the lab must continuously monitor the patient's condition and the situation of the exam and/or intervention (Figure 3). At different times during each procedure, personnel in each position (scrub, X-ray, monitor, and circulator) are carrying out duties which include constant monitoring of the patient's cardiac rhythm, blood pressure, and oxygen saturation. It is necessary, therefore, for all personnel to maintain a constant vigilance of these parameters. If the patient is extremely unstable, more than one person will be required to circulate. Cardiovascular personnel must be able to give medications routinely used in the lab, deliver cardioversion and/or defibrillation, locate and open supplies requested by the doctor, and operate all equipment regularly used in procedures. The Invasive Cardiovascular Specialist is proficient in basic and advanced cardiac life support as recommended by the American Heart Association. They are responsible for the radiation protection of patients and personnel, in cooperation with the hospital radiation safety officer, along with electrical hazard protection in cooperation with the biomedical engineering department. There is also a responsibility to maintain sterility of supplies in cooperation with the institution's sterilization and infection control policy. The Invasive Cardiovascular Professional is proficient in the use and maintenance, as specified by the manufacturer, of all diagnostic and therapeutic equipment for procedures in their specific area of operation. The Invasive Cardiovascular Specialist is a well-trained asset that assists the physician and creates the safest of environments for the patient.[4]

Fig 3. Cardiovascular technician comforts a patient during a procedure.

Echocardiography is a safe and painless diagnostic procedure which uses high frequency sound waves (ultrasound principle similar to sonar or radar) to take moving pictures of the heart (Figure 4). The sound waves are directed towards the heart from a small hand-held device called a transducer, which sends and receives these signals. The heart walls and valves reflect part of the sound waves back to the transducer where they are used to produce pictures of the heart. These images appear in black and white or color on a television-like screen. The pictures obtained during this procedure are recorded on videotape as well as on a special type of paper. From these pictures, it is possible to measure the size of each of the four chambers of the heart, to study the appearance and motion of the heart valves, and to conclude how effectively the heart muscle contracts and moves blood out to the lungs and the rest of the body. Measurements taken from these pictures are very helpful to the physician in

determining how well the heart is working and whether or not there are any abnormalities present.

Fig 4. A patient being prepared for stress echocardiography by a cardiovascular technician.

Using the same or similar ultrasound transducers, Doppler echocardiography may be done where sound waves are used to judge the speed, amount, and direction of the blood cells flowing through parts of the heart and great vessels. This test can be used to determine if there are any heart defects, valve abnormalities, or abnormalities of the pumping chambers. When Doppler echocardiography is performed, it is common to hear a swishing sound as the instrument receives and processes the returning information indicating the pathway and forcefulness of blood flow.[5] The Cardiovascular Specialist who works in echocardiography utilizes these high frequency sound waves and other diagnostic techniques for medical diagnosis. The professional level of this healthcare service requires highly skilled and competent individuals who function as integral members of the healthcare team. The echocardiography technician must be able to produce ultrasound images and related data used by physicians to render a medical diagnosis. They must acquire and maintain specialized technical skills and medical knowledge to render quality patient care. The echocardiography technician is a highly skilled individual qualified by academic and clinical experience to provide these diagnostic patient services. The echocardiography technician is responsible for producing the best diagnostic information possible with the available resources. These specialized Cardiovascular Specialists acquire and evaluate data while exercising discretion and judgment in performance of the clinical examination.

The Army Medical Department (AMEDD) is continuously changing to improve efficiency and readiness despite shrinking resources.[6] Reorganization of the AMEDD emphasizes accessible and high quality care with readiness for its go-to-war mission. The Cardiovascular Specialist is committed to both goals. The military occupational specialty (MOS) 91B300-Y6 is also a combat medic. One of the major benefits of the additional skill identifier (ASI) is that it expands the skills and knowledge of the MOS 91B combat medic. Though they have an ASI, Army cardiovascular technicians recognize their foundation remains as a combat medic. The additional experience and knowledge in emergency medical techniques gives the cardiovascular technician proficiency and confidence to react quickly to casualties on and off the battlefield. The cardiovascular technician's high-intensity job promotes combat readiness with real, hands-on experience on a daily basis. It keeps the skills of both the battlefield medic and in-lab technician sharp. With this experience, the MOS 91B300-Y6 combat medic is capable of giving those on the battlefield top quality care in active military operations. Along with this real hands on experience, many MOS 91B300-Y6 combat medics are part of the Professional Officer Filler System. On demand, the Cardiovascular Specialist is capable of meeting needs at all levels of the evacuation system, from front line to rear echelon.

As cardiovascular medicine continues to grow and expand, there will undoubtedly be an increase in the needs and responsibilities of the cardiovascular technician in both the hospital and field environment. New ultrasound technology will enable more valuable information to be acquired on the future battlefield of the 21st century. This technology will provide the means to evaluate injuries for fluid accumulation giving better capability to triage and evacuate. This will enhance the job of the cardiovascular technician and provide a better quality of medical care to the soldier on the battlefield. The Army's Cardiovascular Specialist is a highly skilled, highly trained, soldier medic. They are an asset and strength to medical readiness in the U.S. Army now and in the future.

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SPOTLIGHT ON
Madigan Army Medical Center

The Cascade Mountain Range of Northwest Washington state serves as a backdrop for Madigan Army Medical Center (MAMC). Situated near Tacoma, the 414-bed (expandable to 622) four-building complex was completed in 1992, replacing a facility that was constructed in 1944. The 1.2 million square foot medical center averages over 900,000 outpatient visits per year.

MAMC provides general medical care (inpatient and outpatient), veterinary care, and environmental health services to qualified beneficiaries throughout the Western Regional Medical Command area of responsibility.

The MAMC Improvement Award Program

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Madigan Army Medical Center (MAMC) is the largest military medical facility and the center of both primary and referred care in Region 11 of the Department of Defense (DOD) managed healthcare program TRICARE. This region serves much of the western half of the United States, including Alaska. How does MAMC use incentives to stimulate improvements? The medical center is organized into functional areas which emphasize the "process" of care rather than the departmental delivery of care. The Improvement Award Program (IAP) was conceived by a multidisciplinary group including representatives from all major functional areas in our hospital. That same group chartered a 10-member team to produce a plan for review in Sep 96. The resultant program, called the IAP, was to provide both financial and human motivational incentives for generating improvements. Specifically, the improvements were to make managed medical care a success by changing the process of operations, as outlined below, under the listed award criteria. The current IAP was presented, approved, and funded by our governing body and interdisciplinary fiscal board with final approval by the Commanding General. Individual training in Total Quality Management (TQM) is required for all employees at MAMC and is the basis for the corporate culture of our matrix organization. An annual program of $100,000 was established for incentives to groups which satisfied the IAP competitive objective award criteria. The IAP was empowered to distribute these funds to the teams which showed quantifiable superiority using (1) multidisciplinary (2) process oriented improvement which increases (3) efficiency (4) quality or standard (5) resource management (6) productivity and (7) reduces deficit.

Execution

The IAP team solicited "grass roots" proposals for improving the Root Cause issues hindering the process of delivering managed healthcare. These proposals were submitted by groups organized by those actually performing the work. Continuous Quality Improvement (CQI) was the tool used to develop both the IAP as well as the programs submitted by each award winning team. Standardized electronic template submission forms contained objective competitive categories such as resource, productivity, and fiscal analysis. Successful competition for these awards required development of a "best practice" program. The 10 IAP board members objectively evaluated each proposal with the seven point format listed above, resolved reviewer variation, and set requirements for minimum scores. Summaries from the original electronic submissions and the results of these semiannual boards were delivered in formal, well-attended and dramatic community ceremonies, published in local news media, forwarded in 1997 to the Army Medical Department (AMEDD) for distribution, and briefed in 1997 to the AMEDD Surgeon General.

Results

In *18 months, 39 projects* were selected for awards. These projects included *364 participants,* for an average team size of 9.35 people per project. The total resource "saving" or cost avoidance was **$11.1 million**; thus, a mean of *$285,010 per project.* The 10 MAMC board members validated the cost avoidance estimates for each project and presented awards in denominations between $1,000 and $10,000. These funds were used locally by the workforce which generated the project to augment education and development at MAMC. The average Return on Investment was *$65.39 for each $1.00* invested. The

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increase in staff involvement in the IAP by 8% per year, for a 1 1/2 -year total of *12%,* indicates MAMC staff supports the program. Point of contact: Lester H. Reed, COL MC, DSN 782-1290 or Commercial (253) 968-1290.

Organizational Approach

Mission. How can MAMC use incentives to stimulate improvements? The IAP is designed to reward (1) multidisciplinary groups which use an improved (2) process to increase institutional (3) efficiency (4) the quality or standard of care (5) resource management (6) productivity; and (7) to reduce deficit. It is the program, as well as the process of how these incentives are awarded and distributed, which is the focus of this submission. The program offers monetary incentives and organizational recognition for those initiatives which continue to generate substantial savings and cost avoidance for our institution. It allows MAMC, as a matrix organization, to recognize achievements along functional lines as opposed to the more traditional, departmental organization.

The key result areas to benefit from the program include: improved institutional efficiency, quality and standard of care, resource management, productivity, and reductions in deficit. The program is in direct support of MAMC's mission to provide superior patient quality care in the most efficient, cost-effective manner to TRICARE Region 11 beneficiaries. The largest military medical facility in this region, MAMC serves much of the western United States, including Alaska. Managed healthcare is fully operational in Region 11, and these incentives are designed to reward programs which produce improvements to maximize MAMC's clinical and fiscal position in this managed care environment. Key customers include: patients who benefit from improvements in the standard and quality of care and improved efficiency, departments and services which benefit from a reduction in cost, and the multidisciplinary team members who receive a monetary award for their initiatives.

Improvement Identification. The Executive Board of Directors (EBOD) is a totally integrated multidisciplinary group which serves as the institutional governing body having oversight of hospital process, function, and improvement, and is the chief advisor to the Commander. The EBOD provides a forum for discussion, decision making, resource allocation, information exchange, policy making, implementation guidance, enforcement, and consensus building that provides a functional rather than departmental focus for the organization. Chartered Quality Management Groups (QMG) in these functional areas, designed to identify and solve problems in an interdisciplinary manner, are represented on this board. All major functional components of the medical center are contained in one of these QMGs, such as those for all of specialty medical care, primary medical care, inpatient functions, and ancillary support services, for example. Its multidisciplinary membership reflects MAMC's matrix organizational design, and it is led by command representation from the Deputy Commander for Clinical Services (DCCS).

The concept for the IAP was first discussed with the DCCS and the Deputy Commander for Administration (DCA), and then briefed to the EBOD. With full support of the EBOD, membership in the subcommittee was solicited to consider nominees for improvement awards from functional areas identified by the EBOD. Initiatives to be reviewed by the Improvement Award Committee represent processes for improvement that incorporate a multidisciplinary team approach. As incentives, the IAP provides for an equitable monetary award and formal public recognition. It emphasizes the managed care approach with an interdisciplinary focus, and supports the organization's re-engineering initiative by rewarding improved efficiency and reduction in deficit. The program allows for the recognition of the multidisciplinary team in a matrix organization and permits the reinvestment of awarded funds across the multiple disciplines directed to the successful groups. Funding for the program is reviewed by the institutional and multidisciplinary working and senior Program Budget Advisory Committees which are comprised of representatives from all budgeted areas within the institution. The continued submission of applications by teams to the program, since its inception over 18 months ago, reflects the continued interest, support, and popularity of the program by the institution.

Team Selection. Once the EBOD approved the concept of the Improvement Program, volunteers from the organization in 10 functional areas identified by the EBOD were solicited for their interest and ability to contribute to the improvement process as well as their pivotal positions in the delivery, outcome, and evaluation of medical care. Final selection of the committee membership included nine representatives from diverse areas and departments of the hospital, and one chair. The membership included representatives from the Departments of Nursing, Medicine, Surgery, and Pediatrics as well as the Primary Care, Inpatient, Clinical Services Support, and Episodic QMGs, and the Resource Management

Division. Obstetrics and Gynecology was represented through the Inpatient QMG. At present, the Chair is the Chief, Department of Medicine, but this nonvoting position may be rotated, at the election of the board, to a representative from any one of the identified functional areas. The membership was subsequently submitted to the EBOD and approved. The Committee works under the direction of a charter approved by the EBOD and published 3 Sep 96. This charter outlines the committee's purpose, structure, process, and programmed budget.

Team Support. The CQI Model guided the formation of the IAP. It is the umbrella that links institutional activities through functional measurement of performance with the goal of continuous improvement through prioritization and informed decision making. The TQM culture emphasizes the commitment of leadership to a supportive organizational milieu in which continuous improvement forges change over functional as opposed to more traditional departmental "stovepipe" lines. The TQM environment recognizes the corporate responsibility to integrate the implementation of quality improvement over multidisciplinary and interdepartmental lines. Its primary focus is on the processes of healthcare rather than specific events.

A considerable investment has been made to train all members of the MAMC organization in the principles of CQI which include: New Employees' Orientation, the TQM Managers' Course, Hospital Executive Leadership Program, Successful Work Innovations and Methods, and Factual and Clerical Training Support. Each one of these programs is focused to a different level of participant. In addition to its ongoing support of training in TQM, the organization continues to sanction the IAP through dedicated assignment of financial resources, organized recognition of award recipients at the highest level, and dedication of personnel to review program applications. Recognition in a newsletter and through electronic mail to all departments is also carried out. Committee members are empowered by the EBOD to select winners of the Improvement Award based on their evaluation using seven criteria: (1) multidisciplinary in nature and (2) process oriented improvement in (3) efficiency, (4) quality or standard, (5) resource management, (6) productivity, and (7) deficit reduction. The committee provides regular summary reports to the EBOD, DCCS, and DCA.

Process

Root Cause Identification and Analysis. In line with the quality improvement initiatives in DOD, MAMC examined methods to expand the ability to integrate the concepts of quality with cost containment into the institutional culture. The mechanism decided upon by the EBOD was to empower an awards committee to distribute $100,000 over 1 year's time for quality improvements leading to cost containment in the areas listed above. Members of the committee were selected from nine various clinical care and infrastructure areas of the hospital, both of which involved, in part, some of the MAMC functional QMG which had been previously organized from interdisciplinary sources. These QMGs are chartered to isolate issues and develop solutions using interdisciplinary strategies. The nine members and the chair represent all major functional areas of the hospital.

The committee initially met twice to develop criteria for inclusion into the awards cycle. The members decided not to dictate the best areas for improvement but to follow the "grass roots" model which would allow the lowest level of institutional areas to find ways to save money while improving or maintaining quality. The board felt that the initiatives ought to define how many people actually participated in each project with the percentage of time given by each of the team members. Only projects with a minimum of 6 months of actual collected data over the life of the project, but no more than 18 months prior to submission, were to be considered for awards. These time lines would ensure adequate data for cost/time analysis and encourage continued and frequent submission as well as institutional feedback of contemporary improvements. Specific regulations prohibited resubmission of the same project unless dramatic changes had occurred in the program.

Improvement Selection and Execution. The board developed a matrix consisting of the seven items explained below. Teams identified their issues and process tools for measuring improvements in the standardized submission packet available in an electronic template and made their submissions electronically. *Multidisciplinary* meant that the project ought to extend across conventional boundaries from the traditional "stovepiping" of efforts in a departmental fashion into a broad-based interdisciplinary culture. *Process Oriented* meant that the project contained a change in methodology (process) producing an improved efficiency and/or quality in both process and outcome. *Increased Efficiency* encouraged teams to find ways to increase performance without increasing cost. *Improved Quality or Standard* involved the improvement to a higher level or best benchmark practice in the teams' areas. *Improved Resource Management* involved redesigned budgets, increased efficiency, or logistical

improvements that saved money. *Improved Productivity* meant that the project showed an increased and meaningful product unit in the current managed care setting. *Reduction of Deficit* related to the ability to more efficiently perform tasks, thereby decreasing outlays of dollars.

An example of the type of project which won recognition is the outpatient surgical evaluation process for children who require small tubes in their ears to control infection. This process was refined from a multiday, multivisit requirement to a **single** half day, one-step procedure for the completed preoperative evaluation. This particular initiative required coordination of administrative and clinical services which had to modify their practices to accommodate the compressed evaluation. The recapture of funds exceeded $2 million per year and the backlog of cases disappeared. Patient acceptance of the program which allows for a single hospital visit with a child while preparing for surgery was noted.

Each project team submitted a written summary in advance of the 10-member Board's meeting and these were independently reviewed, using the seven matrix criteria, by the Board members. The nonvoting chair was present to bring about a consensus and to finalize the decision process. The cumulative score was then posted and an order of merit list determined. Wide deviations between Board members were discussed and then restored to develop a consensus order of merit.

Communication. The projects which were awarded cash prizes were then announced at a MAMC awards ceremony, with the winning projects being publicly recognized by the Hospital Commander. This ceremony was a formal affair called "Show Me The Money" with a Master of Ceremonies and attendance and participation by the entire command group. The awards ceremony was preceded by a week of preliminary electronic advertising of the various projects and universal anticipation of the winners. Project winners were finally announced at the ceremony in ascending order of their cash awards which ranged from $1,000 to $10,000. An oversized check representing the $10,000 award was presented to the authors selected for first prize for each semiannual ceremony. The added suspense of disclosing the winners in ascending order leaves a stage with two exceedingly hopeful candidates and helps to set the tone of importance and universal institutional support of the program.

The funds for each project awarded a prize were placed in a special account accessible by a single POC who had been identified in the original proposal. The funds were encouraged to be used to further develop ideas and projects that would continue to advance the program which had been recognized for the award. The IAP board monitors these awards to ensure equitable distribution to all of the awarded team members and to make certain that they meet governmental policy regulations.

The Executive Summaries were briefed to The Surgeon General and to the Assistant Secretary Department of Defense for Health Affairs in 1997. A summary of the program was also forwarded to the Center for Healthcare Education Studies at the AMEDD Center and School during 1997. The individual project summaries were published on the MAMC electronic mail system as well as in a local post newspaper. Titles of nine of the award winning projects are listed below to exemplify the diversity of the areas involved: *(1) Department of Emergency Medicine Observation Unit. (2) Pediatric Eustachian Tube Pathway. (3) Pediatric Re-Engineering. (4) Ambulatory Surgery Initiative. (5) Pediatric Cardiovascular MRI as an Alternative to Conventional Invasive Angiography in the Assessment of Congenital Heart Disease. (6) VA Sharing Agreement. (7) Heart Failure Management Clinic: An Integrated Multidisciplinary Approach to Care. (8) Colposcopic Training of Primary Care Physicians to Augment Screening Colposcopy Resources. (9) Evaluation of Early Discharge Program of Mothers and Infants following Childbirth in a Military Population.*

Four of the 43 projects submitted were returned to the POC for the group. Thus, 9.3% of the total number of projects were returned to request revisions, additional documentation, further data collection, or improved savings analysis. This feedback to the project authors was designed to improve the original project or the way in which it might be presented to the community and thereby its subsequent acceptance.

Conclusion

Improvement Effort Results. The IAP was designed to involve interdisciplinary groups of people in the identification and solving of process-related inefficiencies. Over the 18-month history of the program, more than 360 people, organized into 39 individual working groups, have been recruited into action at MAMC (Figure 1).

Resource savings and cost avoidance was calculated and validated by the nine-member review board for each of the 39 project awards presented to the IAP. The cumulative savings and cost avoidance

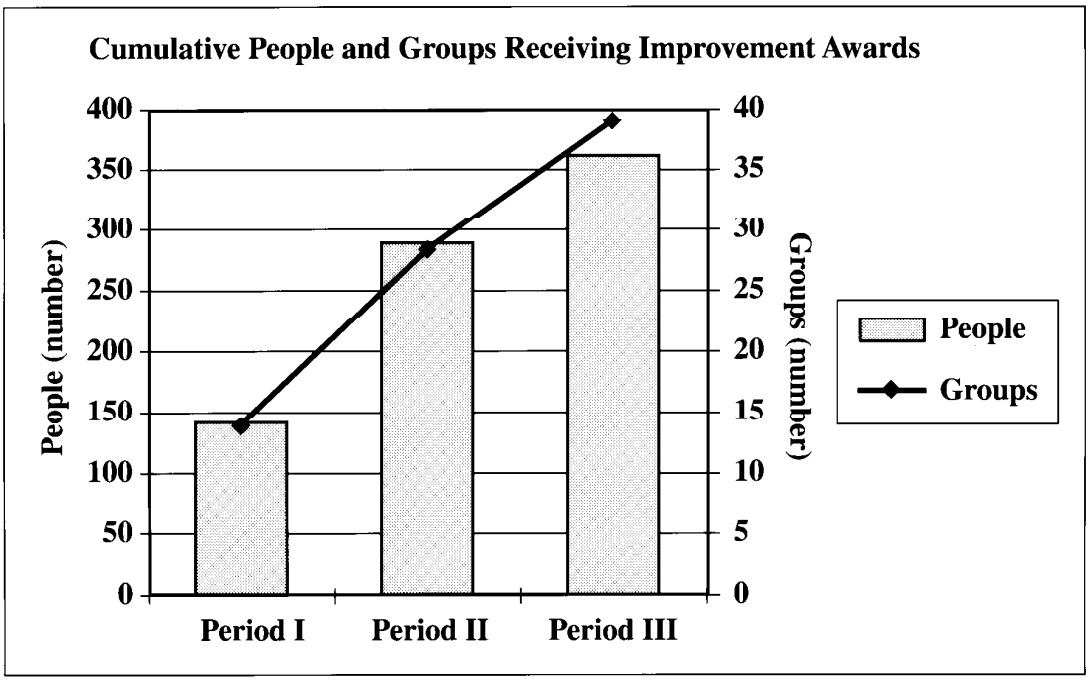

Figure 1. The cumulative involvement represented by both individual participation and the number of groups is represented. The three periods of measurement indicating the suspense for the proposal submissions are the same for subsequent graphs and are Jan 97 (Period I), May 97 (Period II), and Jan 98 (Period III).

for these projects at each of the Award Periods I (Jan 97), II (May 97), and III (Jan 98) is represented in Figure 2. The total is $11,115,410 for the duration of the program, with a mean savings and cost avoidance of $285,010 per project.

Impact of Results. These improvements have helped MAMC manage efficiently and succeed financially in our managed care environment. A reduction in buying power as a result of a decrease in the FY 97 and 98 budgets was experienced at MAMC. After adjusting for inflation, MAMC had an $11 million reduction in buying power in FY 97 and a $4.8 million reduction in FY 98. Consequently, this represents the same clinical responsibilities with approximately $11 million less operating funds. This increased productivity, given the listed constraints, helped the Pentagon Comptroller identify MAMC as a Benchmark Medical Center in the Pentagon Health-Budget Proposal submitted to Congress.

Sustainability and Standardization. All of the projects were submitted in an electronic template which included an Executive Summary suitable for publication as an abstract of the key features of individual projects. Each project was submitted in the

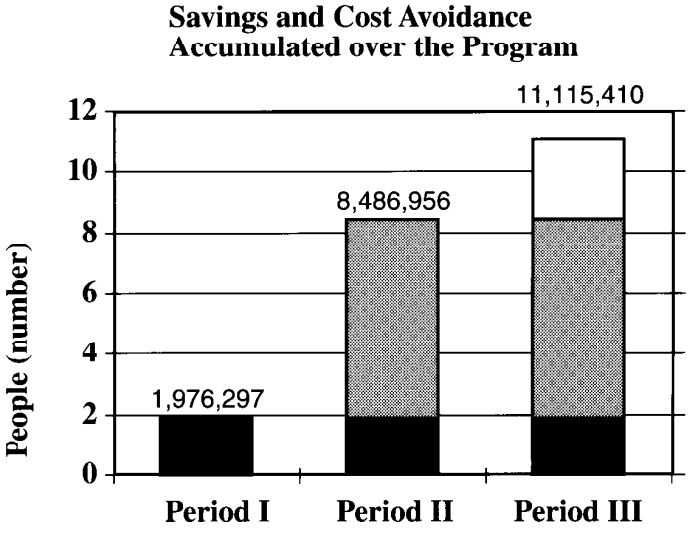

Figure 2. The cumulative "savings" and cost avoidance over the project shown.

TITLE OF SELECTED PROGRAMS	DESCRIPTION OF PROGRAM
PE Tube Pathway	The pathway shortens the routine appointment for clinical assessment from 5 days to 1 day.
Cesarean Section Pre-Packs: Quality Improvement, Enhanced Efficiency and Cost Containment	This $ 40 savings for each cesarean section translates into at least $16,000 a year at MAMC.
Operating Room Suture Standardization	This project resulted in a 43% reduction in product codes with savings totaling $89,553.99 per year.
Reengineering the ADS Process within the Department of Medicine	The process has improved the ADS compliance rate from 72% to 95%.
Multidisciplinary Breast Cancer Pathways	Breast cancer patients are seen at a single visit by a team of breast cancer healthcare providers who then develop an optimum definitive treatment strategy.
Enhancing Primary Care Capacity Through Workspace Restructuring	These changes were responsible for increased enrollment capacity and over $300,000 in cost avoidance.
Pediatric Observation Unit	This unit has realized 328 avoidable (admission) bed days equating to a cost avoidance of approximately $198,690 for MAMC during the period of study.
Vaginal Delivery Pre-Packs: Quality Improvement and Cost Containment	This pack saves MAMC $17.00 per delivery and it could potentially save $900,000 a year for the entire DOD.
Reengineering Outpatient Pharmacy: The Bank Teller Concept	Patient's waiting times have decreased 66% from 1 hour to approximately 20 minutes.
Intervention Pharmacist	Current results estimate that $250,000 per year are saved from MAMC's pharmaceutical budget.
Heart Failure Management Clinic: An Integrated Multidisciplinary Approach to Care	This program beneficially impacts the direct and indirect cost of care for heart failure provided by MAMC and the AMEDD.
Outpatient GYN Chemotherapy	This program has provided improved convenience to GYN patients requiring chemotherapy and improved Resource Utilization at MAMC.

Specific Examples of Award-Winning Programs

standardized template to facilitate evaluation for developing an order of merit list and to allow easy reference and distribution of key features such as the "Savings Calculation," and "Team Members." In order for a project to be considered, it had to have been in effect and collecting data no less than six, and no more than 18 months before the suspense date of submission. This time constraint both guaranteed a sufficient interval to determine if the program would be sustained as well as to ensure timeliness of the project results.

The financial awards, which were delivered to the groups in denominations between $1,000 and $10,000,

were designed to support the sustained efforts of the groups. Over the 18-month history of the IAP, the cumulative workforce involvement has increased at a nearly constant rate of 8% per year, reaching in Jan 98, a total contribution of 12% of our nearly 3,000 employees. This continued involvement ensures sustainability of the program which, at the current rate, will involve nearly *50%* of our workforce in less than 5 years from now.

In one specific program which had provided new pharmaceutical guidelines to the institution and had generated $150,000 in savings, the $5,000 award was used to hire a temporary consultant to analyze and recommend a cost-efficient, lipid-lowering guideline for the institution, further augmenting the original project's savings. This particular example emphasizes the manner in which the awards have been used to further facilitate the process of improvement and to provide MAMC a lasting return on the investment.

The results of the three boards and the review of the Executive Summaries were distributed locally within the medical center, the environs around the medical center, and nationally. At the local level, a semiannual awards ceremony is held in which the projects and their winners are recognized by the Commanding General and their peers. Preceding this public festive awards ceremony, each Executive Summary is posted on MAMC's local electronic communication network, as well as in the local post newspaper.

The board took action to improve some of the submitted programs by returning them to individual authors with suggestions for refinement, data collection, or redirected implementation. Over the course of the 18 months that the IAP has been active, four projects have been returned to their groups for such revisions, representing 9.3% of all submitted products.

Return on Investment. The 10 board members are composed of nine voting members and a nonvoting chair, with an average pay grade in the level of 05.3 (range: 04 to 06). The advertising, proposal review, board meeting, minutes preparation, and ceremony development equals approximately 120 days of one full time equivalent annually at this mean pay grade. Therefore, using a mean overhead cost of an MC 05 of $90,000, the annual overhead for the group would be $30,000. Thus, the 18-month program, with a cost avoidance and savings of $11,115,410, minus awards ($122,438), minus personnel overhead of the program ($45,000), divided by the sum of the awards and overhead ($167,438), equals a return of **$65.39 for each $1.00 invested** (Figure 3). The 39 individual programs calculated their savings as a summation of the costs avoided or saved with all reasonable variables included for analysis and then presented them in the standard format.

The tangible benefits of the program added directly to our institutional *avoided cost* for FY 97 and in later years by the amount of $10,948,770. Some of this saving was able to be realized within the same FY and other savings would have benefits in later years.

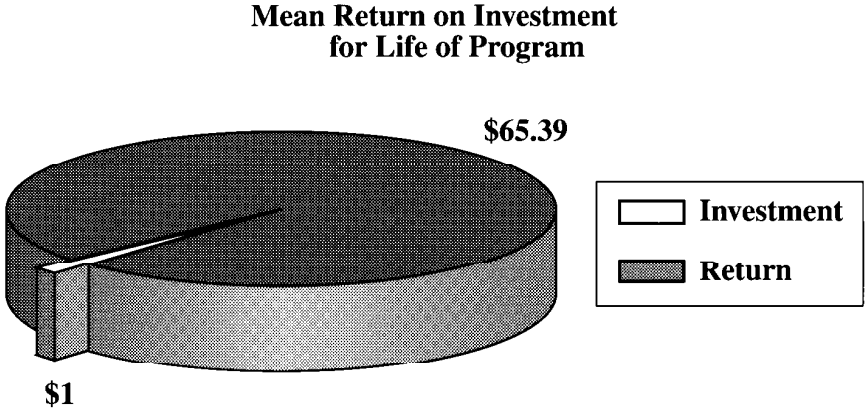

Figure 3. The cumulative Return on Investment for the 18-month history of the program is shown.

The cumulative return on investment by the command is shown in Figure 3.

The intangible returns to the hospital are manifested in our strengthened TQM culture to reward group performance as well as an improvement in process rather than the historical focus on strictly the work unit accomplishment rate. Workforce morale, which may only be measured as a function of the organization's success, is heightened by the availability of cash incentives and command recognition. The MAMC's success in the area of managed care and fiscal management was expanded upon at the beginning of this section. Patient satisfaction in the particular areas where IAP programs have won is a common occurrence.

Satisfaction, Requirements, and Validation. The outstanding performance of the IAP has shown that the authors of individual projects receive a satisfactory

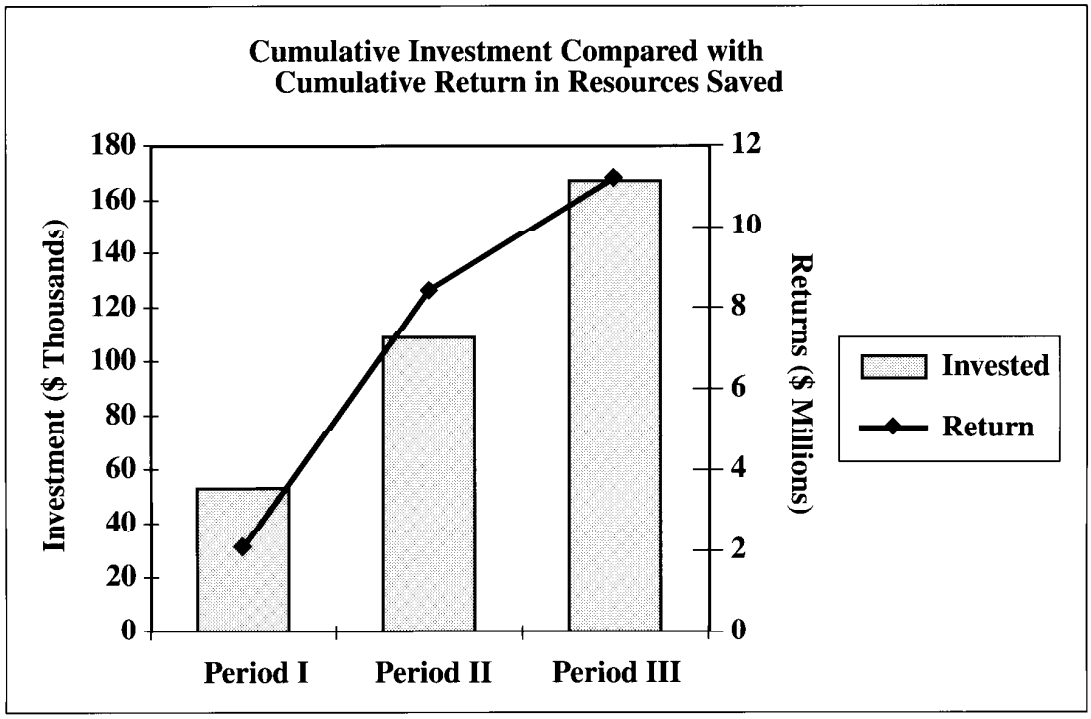

Figure 4. The cumulative Return and Investment for each period studied is represented in this figure. The dates for the periods are the same as previous graphs.

enough incentive to advertise this and to encourage their peers to continue submitting projects. The number of projects submitted at each semiannual session remains consistently at 14, with an average number of people per group of between 7 and 10 participants for each project (Figure 1). The cumulative Return on Investment has steadily increased to reflect the continued workforce involvement with the program. These cumulative returns are displayed in Figures 1 and 4.

Over the 18-month history of the project, the cumulative involvement in the program has increased to include a minimum of 364 people. This represents an approximate involvement of 12% of the institution's entire workforce in generating interdisciplinary, process-related programs designed to reduce deficit and improve efficiency (Figure 1). Since these are voluntary proposals which are submitted, they represent continued support by the workforce of MAMC for this program. The individual results, which go beyond fiscal benefit to the institution, can be extracted from the Executive Summaries which were published. These results were validated by the 10-member IAP board during the review process of each award.

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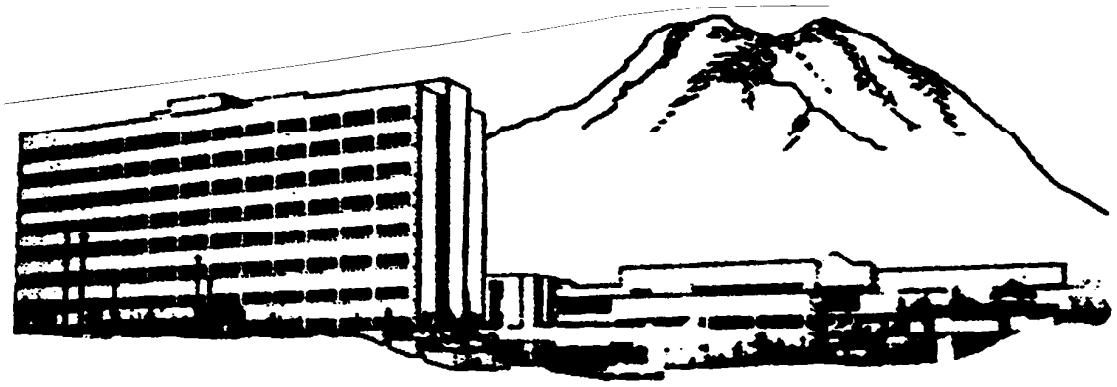
Madigan Research Day Proceedings

28 May 1998, Letterman Auditorium,
Madigan Army Medical Center
Fort Lewis, Washington

The goals for this program were threefold: Celebrate the Exceptional Scope of Scholarly Activities at MAMC, Incite Enthusiasm (for Further Studies, Grant Submissions, and Publications at MAMC), and Attract Grant Support for MAMC.

Four presentations have been nominated for awards (Army Achievement Medal): Innovation, Interdisciplinary, Discovery, and Change In Practice.



INTRODUCTION

You can think that you are good!

You can even believe that you are good.

It's something else to have the courage to submit your best effort to peer review...

If your peers think its good, then you are good!!!

Research occurs because of extra effort, requiring a voluntary sacrifice of personal time, and risking criticism of one's ideas. It's a good thing. And it's something for which we can all be proud. Madigan Army Medical Center's First Annual Research Day celebrates those who have the courage to be curious in public.

Brigadier General George J. Brown
Commander, Madigan Army Medical Center

Military Unique Clinical Investigation

Moderator: Carroll Ray Dotson, LTC, MSC

Emergence Of Military Medicine:

Historically, the purpose of military medical service was to salvage manpower for the defense forces. Today, not a single major military establishment in the world is without a formal military medical service. Medicine is a dynamic, technology-based profession, the practice of which is being continuously modified by the new knowledge and new technology being produced by the massive civilian biomedical research and development community within which the military medical system is immersed.

It is essential for the "readiness" mission that the military medical departments practice high-quality, technologically up-to-date medicine in peacetime. The operation of accredited Graduate Medical Education (GME) programs in military medical centers and facilities provides necessary institutional mechanism for making this feasible and successful both militarily and medically. Each military medical department anticipates that in wartime it should be prepared to deal with large numbers of patients with traumatic injuries or massive exposure to toxins or infectious disease agents. The training that military healthcare providers receive in peacetime in military medical facilities is intended to assure that the healthcare providers in these medical departments have the necessary military and medical skills to provide the services required of them in support of the military mission.

Our teaching medical centers are aware that the purpose of the GME training programs is to train physicians to support the operational missions of the armed forces. In fact, the clinical care element of the military training programs is often indistinguishable from that in the civilian hospital community with the same and similar medical training programs. The main difference between residency programs in military facilities and those in the civilian counterparts is that the Department of Defense (DOD) programs orient the physician trainee to the military system providing the background for practicing their essential skills under conditions of conflict or national emergency.

GME Programs (Clinical Research):

The most respected civilian graduate medical programs provide strong, well-funded clinical research programs to residents and fellows. In these matters, clinical research is widely accepted as a measure for "outstanding" physicians and the clinical training programs that prepare them for their professional challenges. Retention of high-quality GME by the DOD is essential to readiness and in the current funding constraints, it is consistent with the cost control realities of today's defense establishment. Currently, most civilian medical schools and graduate training programs do not adequately teach the principles of combat medicine. Therefore, the military must rely upon itself even more to provide the medics capable of practicing their trade in unique settings and be prepared to support the combat mission at any location worldwide.

The Path:

We need facts to produce new theories, but we also need theories to produce new facts. Basic research is the first step in a multistep process to develop new theories and facts. This is followed by applied research and development of the pathways that may lead to the implementation of these findings. Clinical investigation then takes the theories and facts another step, into the medical setting where promising findings are tested in clinical trails. Finally, demonstration programs are established and instituted resulting in new healthcare delivery, improved disease control, or new prevention and treatment matrices. Clinical investigation in the military setting is a process, the way to develop and refine medical care practices to support the soldier, airmen, and sailor in the conditions which are peculiar to them and their dependents.

Military Unique Clinical Investigation:

The care and welfare of our soldiers, airmen, and sailors is the central concern of our (military) research efforts. The essential process required to preserve and maintain the fighting strength (...salvage our manpower for the unique military missions...) is to anticipate the threat, solve the problems, and work through the medical challenges that the deployed soldier may encounter. At the Joint Services GME Selection Board, Secretary Martin coined the term "Military Unique Clinical Investigation." Subsequently, The Surgeon General from each of the DOD services stated that more military unique curriculum development and more military unique research were needed. This message was clear and anticipated here at Fort Lewis by both Madigan Army Medical Center (MAMC) and I Corps leadership. There is already an existing tradition of collaborative militarily relevant clinical investigation efforts between MAMC and I Corps and this remains a fundamental element of future plans at this installation.

Our first presentation this morning is a command initiated inquiry, a study designed to help the commander do the "right thing" in training the troops. The second presentation describes initiatives in the enlisted female readiness arena

and describes the translation of the recently developed Department of Army's "Female Soldier Readiness Leader's Guide" into an Air Force version compliant with their policies and procedures. Both these models can now be considered for "regional" implementation. Next, we hear a report of a study seeking to achieve improved resolution of broken bones to return the service member to the military forces to "fight" another day.

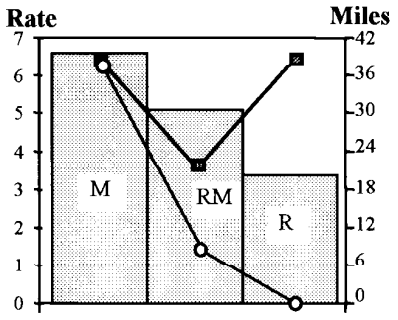
Your presence and participation at the **"FIRST ANNUAL MADIGAN ARMY MEDICAL CENTER RESEARCH DAY"** is appreciated and is part of the success story being told here. I wish to extend my gratitude and appreciation to each of today's presenters and their mentors, co-investigators, and supporters.

The Effect of Loaded Foot Marching vs Running on Injury, Fitness, and Performance In U.S. Army Light Infantry Soldiers

Dan C. Norvell, CPT, SP[a], Joseph R. Dettori, COL, SP[a], Drew C. Peterson, CPT, MC[c], Troy H. Patience, BS[b]

[a]Physical Therapy, Physical Medicine & Rehabilitation Service and [b]Department of Clinical Investigation, Madigan Army Medical Center, Ft Lewis, WA and [c]Brigrade Surgeon, 1st Brigrade, 25th Infantry Division (Light), Ft Lewis, WA

The mission of the light infantry soldier is to road march several miles with a heavy load prior to engaging in battle. Presently, Army soldiers' fitness and physical readiness is measured by the Army Physical Fitness Test (APFT) which includes pushups, sit-ups, and a timed 2 mile run. Most light infantry soldiers spend their physical training (PT) time doing these three activities rather than foot marching. Some units are increasing their marching mileage for the purpose of training more specifically. The purpose of this study is to determine the effects of loaded foot marching versus running performed during PT on injury rates, fitness, and performance. Three light infantry companies were divided into the following PT groups: march only (M, n=92), run/march (RM, n=101), and run only (R, n=103). PT was performed 3 times/week. The APFT, 12 mile loaded foot march, marksmanship range and an obstacle course were performed at the beginning and end of the study. While there was no difference in injury rates among the groups (11.8, 11.7, and 11.4 per 100 soldiers/month respectively), those who marched with 50-pound rucksacks injured themselves more during PT (figure. circles are marching/month. squares are total miles/month). Compared to the beginning of the study, the R and RM groups were faster in their 2 mile run times (28 seconds and 14 seconds, respectively), while the M group was slower by 43 seconds (ANOVA, $P<0.0001$). There were no significant differences in marksmanship following the 12 mile loaded foot march but runners significantly outperformed both marching groups in the obstacle course ($P=0.003$). We conclude that military leaders and health professionals must consider the negative effects of loaded foot marching. Marching is more combat oriented and therefore, should not be avoided. However, loaded foot marching in place of running for PT is associated with more injuries during PT, decreased fitness, and decreased performance.



Presenter: Daniel C. Norvell, CPT, SP

Mentor: Joseph R. Dettori, COL, SP

Female Airman Readiness: A Leader's Guide

Kelly A. Hartley, A1C, USAF[a] & Byron C. Calhoun, Lt Col, MC USAF[b]

[a]62nd Medical Group, McChord AFB, WA & [b]Maternal Fetal Medicine Service, Department of OB/GYN, Madigan Army Medical Center, Ft Lewis, WA

Every military leader is a manger of time, resources, and people. This presentation outlines our introduction of the Leader's Guide, a handbook for leaders responsible for managing a growing segment of the military personnel pool-the female airman. The military is well on its way to providing challenging and rewarding career paths for all its service members. How a leader utilizes and develops these resources depends upon knowledge of the many potential missions as well the unique attributes of each team-member. The handbook and the resources references within it are meant to help leaders integrate this knowledge into the planning process, eliminating potential problems before they can disrupt the mission. The handbook covers the areas which usually leave leaders guessing, such as pregnancy profiles, exercise during pregnancy, postpartum recovery, field needs of females, and preventive measures for the dormitory environment. The handbook is intended mostly for leaders at the level where the command chain ends and the work begins. The responsibility for female readiness ultimately falls to the female airman themselves. Readiness requires preparation based upon specialist expertise and field experience.

Presenter: Kelly A. Hartley, A1C, USAF

Mentor: Byron Calhoun, Lt Col, USAF

Does Insertion of a Cortical Bone Screw into Bone Change the Torsional Strength? A Biomechanical Study

George K. Bal, MAJ, MC

Orthopedic Surgery Service, Department of Surgery, Madigan Army Medical Center, Ft Lewis, WA

Purpose: To determine if the torsional strength of a cortical bone screw is compromised by a single insertion and removal. This occurs when a bone screw is placed intra-operatively, judged to be too long, and removed.

Methods: We studied 3 different cortical bone screw sizes: 2.7 mm, 3.5 mm, and 4.5 mm (Synthes, USA, Paoli, PA 19301). The screws were divided into four test groups of 10 screws each: I- a control group of screws tested to torsional failure, II- screws inserted into bone, removed, and tested to torsional failure, III-screws placed through a plate, into a centered hole in bone, removed, and tested to torsional failure, and IV-screws placed through a plate, into an eccentric hole in bone, removed, and tested to torsional failure. All screws were inserted with a calibrated, digital, torque screwdriver into drilled, tapped holes in fresh-frozen, human femora. All screws were then tested to failure on a materials testing machine. Results: The average failure torque for the 2.7 mm screws was 1.45 +/0.09 N-m, 2.67 ± 0.07 N-m for the 3.5 mm screws, and 5.35 ± 0.09 N-m for the 4.5 mm screws. There were no significant differences among the 2.7 mm and 3.5 mm screw Groups. For the 4.5 mm screws, Group III and IV showed a significant decrease in torsional strength of 0.08 N-m, and 0.13 N-m, respectively, when compared to Control Groups.

Conclusions: Single insertion and removal of 2.7 mm and 3.5 mm cortical bone screws does not result in a change in the torsional strength of the screw. The 4.5 mm cortical bone screws did show a small decrease in torsional strength after a single insertion through a plate, and thus the reuse of 4.5 mm screws cannot be completely supported.

Presenter: George K. Bal, MAJ, MC

Mentor: Stephen Benischke, MD

Scientific Approach to Managed Care (Outcomes Study)

Moderator: Bonnie Jennings, COL, AN

This section will focus on a portfolio of studies that represent the scientific approach to managed care. Some would find that to be an interesting coupling–science and managed care. Some would argue that managed care has nothing to do with science. Rather it's about mystic, magic, money, and madness insofar as it is creating a seismic heave in this nation's healthcare.

One way to take the madness out of managed care is through science, or at least through using a scientific approach to examine the world of managed care; to examine what works, what does not, and at what cost. The goal of such examinations is to ensure cost-effectiveness is in balance with a complimentary to quality patient care.

This particular scientific approach detours from many classic methodologies. In many respects, we are talking about a new genre of science–a burgeoning field known as outcomes studies. Outcomes studies is a rubric that encompasses both outcomes research, or those studies that examine which interventions are most efficacious, and outcomes management, or those studies that examine efficiency or how to reduce unintended variation and evaluate resource consumption. It is studies in this latter group that mandate a new research prototype. It is also studies in this group that are driven by the pragmatic questions emanating from the operational world of healthcare delivery.

Because of concerns about the cost and quality of care, it is not surprising that outcomes studies are growing exponentially. Rather than viewing quality and cost as opposing forces, our patients are better served if we consider the words of Roper and Hackbarth who noted, "The quality and cost of healthcare services are as tightly intertwined as fibers of fine silk."

Outcomes management studies have not yet achieved the same level of sophistication and scientific rigor, overall, as more traditional research. And yet, because they focus on compelling questions and issues derived from the real world of healthcare delivery, we must develop some level of comfort and understanding in dealing with how these sometimes softer data can help us make the hard decisions that surround us today. The series of presentations in this segment of the program exemplify some of the possibilities in outcome analysis; some of the potential that can be realized by using a scientific approach to managed care.

Using Animated Computer Simulation to Determine the Optimal Resource Support for the Endodontic Specialty Practice at Fort Lewis

Donald L. Gebhart, LTC, DC

U.S. Army-Baylor University Graduate Program in Healthcare Administration

Animated computer simulation was used in this study to determine the optimal resource support (dental assistants and dental treatment rooms) for the endodontic specialty practice at Fort Lewis, Washington. MedModel® Healthcare Simulation software was used to compare five scenarios or models with varying numbers of dental assistants and dental treatment rooms. The models were run for 250 repetitions to simulate 1 year of operation. Then the model output data were analyzed with statistical tests, and the models were compared using a decision matrix which incorporated the Dental Activity Commander's preferences and the relative performance rating of each model. One-way Analysis of Variance tests indicated that there were significant differences ($P<0.0001$) in the five computer models. The model with two dental assistants and three dental treatment rooms was determined to have the best overall performance, and therefore, to possess the optimal resource support. Based on the results of this study, it was recommended that the endodontist be assigned two dental assistants and be given access to three dental treatment rooms, if possible.

Presenter: Donald L. Gebhart, LTC, DC

Mentor: William Cahill, COL, MS

The Routine Pregnancy Process: Framework for Clinical Pathway Genesis

Cristen Brandsma, 1LT, AN

Department of Nursing, Madigan Army Medical Center, Ft Lewis, WA

Objective: A multidisciplinary approach to track the involvement of routine obstetrical patients from enrollment as outpatients until postpartum discharge was initiated to explore implementation of an early discharge program.

Design: The use of the interdisciplinary team utilizing nursing services as a major and consistent role in each area of expertise was seen as the key to success. The impact of providing comprehensive and holistic care in the context of the five step nursing process: assessing, diagnosing, planning, intervention, and evaluation were utilized. From the analysis, team members were enlisted from obstetrical outpatient nursing services, pediatric nursing, neonatal nursing, family practice department, labor and delivery nursing, pediatric well-child nursing services, obstetrics/gynecology department, social services, community health nursing, referring hospitals, and pregnant patients including dependent wife and active duty enlisted/officer members to map out the flow of the patient through the entire pregnancy process.

Setting: The obstetrical, family practice, and pediatric outpatient clinics along with labor and delivery and postpartum inpatient services.

Patients/Participants: The control group were uncomplicated patients seen under the previous system (prior to pathway process) from 1 Mar to 31 Aug 94 and the uncomplicated obstetrical study patients seen after the early discharge program (post pathway) from 1 Mar to 31 Aug 96.

Interventions: Implementation of the early discharge program after pathway initiation.

Main Outcome Measure(s): Elucidation of framework for how to proceed with a clinical pathway process nesting nursing process in a complicated inpatient and outpatient setting was achieved. Objective outcomes included: patient satisfaction with an early discharge program, identification with barriers to care, recognition of areas for increased quality of care, and cost consequence analysis (previously presented in detail elsewhere).

Results: There were 1,042 total control patients with routine vaginal delivery from 1 Mar to 31 Aug 94 totaling 2,668 hospital days with a mean number of hospital days of 2.56 per patient (SD-0.878). The study group of early obstetrical discharge patients from 1 Mar-31 Aug 96 with uncomplicated vaginal delivery encompassed 1,050 patients with 1,965 days averaging 1.87 hospital days per patient (SD-1.48) without concomitant increase in unscheduled clinic or emergency room visits. These findings demonstrated a statistically significant decrease ($P<0.05$) in admission length of stay in the early discharge vaginal delivery gravidas. The total cost of admissions fell from $3,257,628 to $2,399,625 ($1,221/day) showing a cost saving of $858,003 over 6 months. The average cost per admission fell from $3,126 to $2,285 without an increase in postpartum pediatric or maternal re-admissions.

Conclusions: Using a multidisciplinary approach to the nursing paradigm involving the five step nursing process we were able to elucidate the process necessary to identify critical nodes patient care and satisfaction while providing significant cost savings.

Presenter: Cristen Brandsma, 1LT, AN

Mentor: Elizabeth Mittelstaedt, LTC, AN

Reduction in HIV Patient Hospitalizations after Adopting HAART

Sue Ellen Fitzgerald, CPT, MC[a], Joseph T. Morris, LTC, MC[a], Robert Gibbons, MAJ, MC[b], Ronald Cooper, COL, MC[a]

[a]Infectious Disease Service, Department of Medicine, [b]Department of Medicine, Madigan Army Medical Center, Ft Lewis, WA

In 1996, the Infectious Disease Service at Madigan Army Medical Center, Fort Lewis, WA began recommending high activity anti-retroviral therapy (HAART) for all human immunodeficiency virus (HIV) infected patients with a measurable viral burden regardless of CD4 count. Such therapy tends to be highly effective in suppressing the infection and allowing the immune system to recover at least some of its function. Although HAART is expensive, there might be a net savings for the hospital if the admission rate of HIV patients were decreased while on this therapy. To explore this possibility, the hospitalization rates of the HIV positive population followed at the MAMC infectious disease clinic were determined before and after initiation of HAART. The military medical system provides a unique opportunity for evaluating the impact of such a policy because the patients are followed as clinic outpatients, receive their prescriptions, undergo diagnostic studies, and are hospitalized as inpatients in the same institution. In 1997, only 10.3% of patients

were hospitalized. In 1994 and 1995, the 2 years prior to initiation of HAART, 33.3% (P=0.0003) and 32.2% (P=0.0005) of patients were admitted respectively. Furthermore, a decrease in all cause mortality was noted after initiation of HAART from 13.0% (P=0.036) and 12.9% (P=0.076) in 1994 and 1995 respectively, to 5.2% in 1997. This decrease in mortality was statistically significant for HIV-related (nontraumatic) deaths. Despite the high cost of these medications, we believe that this reduction in hospitalizations will help to offset the cost of these medicines and that their use in the military HIV positive patient population is appropriate despite the military population's tendency to be diagnosed at an earlier stage in their disease.

Presenter: Sue Ellen Fitzgerald, CPT, MC

Mentor: Joseph T. Morris, LTC, MC

A Prospective, Randomized, Double-Blinded, Placebo Controlled Trial of Cisapride after Colorectal Surgery

Tommy A. Brown, CPT, MC[a], Jerome McDonald, CPT, MC[b], Alec Beekley, CPT, MC[a], William Williard, LTC, MC[a]

[a]General Surgery Service, Department of Surgery and [b]Department of Surgery, Madigan Army Medical Center, Ft Lewis, WA

Introduction: The predominant factor prolonging hospitalization and delaying oral intake after colorectal surgery continues to be return of large bowel function. We investigated the effect of the cisapride on postoperative bowel motility.

Methods: Patients were started on cisapride versus a placebo on postoperative day one after colorectal surgery. Medication was continued throughout the hospitalization. Endpoints included the time to patients' first bowel movement, time of advancement to regular diet, total time of hospitalization, and cost analysis. Results were analyzed using Mann-Whitney U tests.

Results: A total of 37 patients were entered in the study with 17 in the cisapride group and 18 in the placebo group. The median time to first bowel movement, advancement of diet and discharge was 1 day less in the Cisapride group compared to the placebo group (P<0.02). This effect appeared to be similar for patients undergoing emergent and elective surgery, although sample size was too small to demonstrate this statistically. The cost savings were $1,400.00 per hospitalization based on median hospital stay.

Conclusions: Cisapride use results in statistically significant improvement in postoperative bowel motility after colorectal surgery promoting earlier oral intake, decreasing hospital stay, and improving costs. Cisapride should be added as adjunct treatment in postoperative care after colorectal surgery.

Presenter: Tommy A. Brown, CPT, MC

Mentor: William Williard, LTC, MC

Improvement Award Program (IAP)

Moderator: Lester H. Reed, COL, MC

Organizational Approach. Madigan Army Medical Center (MAMC) is the largest military medical facility and the center of both primary and referred care in Region 11 of the Department of Defense's managed healthcare program TRICARE. This region serves much of the western half of the United States, including Alaska. How can MAMC use incentives to stimulate improvements? The medical center is organized into functional areas which emphasize the "process" of care rather than the departmental delivery of care. The IAP was conceived by a multidisciplinary group including representatives from all major functional areas in our hospital. That same group chartered a 10-member team to produce a plan for review in Sep 96. The resultant program, called the IAP, was to provide both financial and human motivational incentives for generating improvements. Specifically, the improvements were to make managed medical care a success by changing the process of operations as outlined below under the listed award criteria. The current IAP was presented, approved, and funded by our governing body and interdisciplinary fiscal board with final approval by the Commanding General. Individual training in total quality management is required for all employees at MAMC and is the basis for the corporate culture of our matrix organization. An annual program of $100,000 was established for incentives to groups which satisfied the IAP competitive objective award criteria. The IAP was empowered to distribute these funds to the teams which showed quantifiable superiority using (1) multidisciplinary (2) process oriented improvement which increases (3) efficiency (4) quality or standard (5) resource management (6) productivity, and (7) reduces deficit.

Execution. The IAP team solicited "grass roots" proposals for improving the Root Cause issues hindering the process of delivering managed healthcare. These proposals were submitted by groups organized by those actually performing the work. Continuous quality improvement was the tool used to develop both the IAP as well as the programs submitted by each award winning team. Standardized electronic template submission forms contained objective competitive categories such as resource, productivity, and fiscal analysis. Successful competition for these awards required development of a "best practice" program. The 10 IAP board members objectively evaluated each proposal with the seven point format listed above, resolved reviewer variation, and set requirements for minimum scores. Summaries from the original electronic submissions and the results of these semiannual boards were delivered in formal, well-attended, and dramatic community ceremonies, published in local news media, forwarded in 1997 to the Army Medical Department (AMEDD) for distribution, and briefed in 1997 to the AMEDD Surgeon General.

Results. In 18 months, 39 projects were selected for awards. These projects included 364 participants, for an average team size of 9.35 people per project. The total resource "saving" or cost avoidance was $11.1 million; thus, a mean of $285,010 per project. The 10 MAMC board members validated the cost avoidance estimates for each project and presented awards in denominations between $1,000 and $10,000. These funds were used locally by the workforce which generated the project to augment education and development at MAMC. The average Return on Investment was $65.39 for each $1.00 invested. The increase in staff involvement in the IAP by 8%/year, for a 11/2- year total of 12%, indicates MAMC staff supports the program.

Obstetrical Prepacks: Quality Improvement, Enhanced Efficiency, and Cost Containment

Carla Howley-Bowland, COL, MC, USA[a], Roderick F. Hume,COL, MC, USA[b], William Cahill, COL, MSC, USA[c], Susan Willig, CW(ret), USA[d], Karen Winter, Maj, NC, USAFR[a], Veronica L. Ventura, CPT, MC, USA[e], Byron C. Calhoun, Lt Col, MC, USAF[b]

[a]Deputy Commander for Clinical Studies, Womack Army Medical Center, Ft Bragg, NC and [b]Maternal Fetal Medicine, Department of Obstetrics/Gynecology, [c]Chief of Staff/Deputy Commander for Administration, [d]Logistics Division, [e]Department of Obstetrics/Gynecology, Madigan Army Medical Center, Ft Lewis, WA

Objective: The purpose of this study was to determine if by applying cost containment management principles the cost of obstetrical delivery could be reduced.

Study Design: With the logistical database, the previous cesarean and vaginal delivery packs were evaluated for design, equipment, and competitive pricing with new prototypes tested for physician acceptability.

Results: The cost of the cesarean pack decreased from $110 to $86 per delivery, saving us $9,600 with 10 minutes saved per procedure and the vaginal delivery pack decreased from $37 to $20, saving $30,000 per year with 5 minutes saved per procedure while providing an indefinite shelf life, latex-free, single packaging.

Conclusions: By the use of simple, multidisciplinary re-engineering techniques applied to the logistical arena we were able to save significant amounts of money by simplifying our packing to a nonexpirable, latex-free, and single unit package. If these changes are applied across the total Department of Defense births of 60,354 including 10,717 (16.1%) cesarean sections the potential savings is $257,208 and 1,786 technician hours/year and for 49,637 vaginal deliveries (83.9%) and 4,136 technician hours/year.

Presenter: Karen Winter, Maj, NC, USAFR

Mentor: Byron C. Calhoun, Lt Col, MC, USAF

Impact of Clinical Pharmacists on Pharmaceutical Expenditures and Patient Satisfaction

C. Becket Mahnke, CPT, MC[a], David L Whaley, PharmD[b], David J. Tomich, PharmD, FASHP[b], Jill Tanner, PharmD[b], Patrick C. Kelly, COL, MC[a]

Departments of [a]Pediatrics and [b]Pharmacy, Madigan Army Medical Center, Ft Lewis, WA

In attempting to control costs, managed care organizations have implemented various methods to reduce pharmaceutical expenditures. We studied the effect of a clinical pharmacist enforcing compliance with prescribing guidelines, with regard to cost avoidance and patient satisfaction. Our clinical pharmacist screened prescriptions for

medications in five therapeutic classes, and informed practitioners when their choices did not comply with our established prescribing guidelines. A prescription was changed if authorized by the provider, and cost avoidance and patient satisfaction were assessed. Data collected revealed a cost avoidance of $26,727 over the 6-week data collection period; simply projecting this figure over a 12-month period suggests an annual drug cost avoidance of $230,000. With regards to patient satisfaction, over 70% of respondents "strongly agreed" with being pleased with the medication dispensed, and only 11% "strongly disagreed." We conclude that significant pharmaceutical cost avoidance can be realized via the use of clinical pharmacist enforcement of prescribing guidelines, without loss of patient satisfaction.

Presenter: C. Becket Mahnke, CPT, MC

Mentor: Patrick C. Kelly, COL, MC

Mentor's Cube Presentation

Roderick F. Hume, Jr, COL, MC

The First Annual Madigan Center Research Day celebrates the breadth and depth of scholarly activity performed at MAMC. The basis for this event is legacy of innovation, discovery, and interdisciplinary collaboration. We give high quality clinical care, while giving our students the capability to privide excellent care in future assignments. And we learn how to give better care, and better teaching through our investigational efforts. We are willing to evalulate our performance and use this feedback to continually improve our process. At the core of this process is the mentor.

A mentor is both teacher and coach. A guide through the new territory of the attainment of special knowledge and skills. But the mentor facilitate's this transformation of the student to become a wise master in their own right. One capable of turning to the next generation to continue the loop of learning. A mentor is an exemplar, not aloof, but not necessarily your "friend." A mentor does not give wisdom, rather a mentor perceives the opportunities for the student to attain wisdom. Being a mentor is painful, hard work. Being a mentor is difficult, and easily misunderstood. A mentor will say just what needs to be said, when it needs to be said, leaving it to the recipient to discover the truth for themselves. This is often not what the protege wants, or thinks that they need. However, the mentor persists by empowering the student in their pursuit. The lever is learning, an active interactive experience. Mutual understanding, subtle communication, direct, and frank dialogue are the most critical skills. The mentor always, and at all times, keeps the student's perspective in mind. Not to coddle or protect the protege from life's experiences, but to help them extract the meaning of life's messages. This process is always an integrated activity just below the level of perception. But the student must recognize the mentor. Mentoring must be requested to be received. A mentor is always a leader, a clarion, a coach, a guide, a joker, a teacher. The mentor is the one with the simple image which clarifies during times of confusion, the laugh in the face of adversity, the light touch, the subtle clue. The mentor understands the process and is a master of the interrelated network of growth and development, ever mindful of the level of maturity of each person involved. A mentor does not choose the protege. Everyone is their student.

A mentor is the master communicator who holds your experience up for your inspection, in all of its facets, so that you can see from many angles. A mentor gives the protege the cube of the shared experience. It is up to the student to build upon that foundation. The first MAMC Mentor's Cube is presented to COL Patrick Kelly.

Medical Education Research

Moderator: Patrick Kelly, COL, MC

Medical Education Research seeks to determine the best method to teach, to instruct. How do we take the lead in learning? Curriculum development is only the beginning. How do you impart enthusiasm for life long learning in our students? What is the outcome by which we measure our success? MAMC teaches teachers, cultivates mentors, and empowers the investigator to question our educational process. The presentations today focus upon healthcare providers in the ambulance, at a clinic, and in a Graduate Medical Education Program.

Consultation Rates for Navy Independent Duty Corpsman in an Acute Care Clinic

John R. Holman, CDR, MC, USN

Department of Family Practice, Madigan Army Medical Center, Ft Lewis, WA

Purpose: Family physicians manage 90% of patients' problems without consulting our specialist colleagues. The consultation practices of mid-level providers such as physician assistants, nurse practitioners, and Navy independent duty corpsmen (IDC) working in family practice clinics have not been described. Having a family physician review consults from a physician extender may prevent excessive specialty consultation.

Methods: For 4 months, consultation rates were recorded for Navy IDCs seeing patients in the hospital staff sick call. Staff family physicians were available as needed for supervision. Specialty consultation was allowed without restraints. Over the subsequent 4 months, the IDCs were instructed to discuss all consultations with the supervising family physician. The IDC and family physician together arrived at the best management plan for that patient. Means and confidence intervals were calculated for the consultation rate for each period. The paired, two-tailed *t*-test was used to compare the data sets for statistical significance.

Results: In the four months without review, the mean consultation rate was 26% (18% to 34%, 95% confidence interval [CI]). In the 4 months with review, the mean consultation rate decreased 64% to 9% (2% to 16%, 95% CI), two-tailed P=0.01. With an average of 140 sick call visits each month, 24 fewer specialty consults were written each month when family physician review was required.

Conclusions: Family physician review of Navy IDC consults from a hospital staff sick call significantly reduced the number of specialty consults obtained by these physician extenders. Under managed care, careful scrutiny of a clinic's practice patterns is essential to optimizing the delivery of top quality and cost conscious healthcare.

Presenter: John R. Holman, MD, CDR (sel), MC, USN

Mentor: Joseph Yetter, COL, USA

Paramedic Decisions with Out-of-Hospital Intravenous Placement

Steve Pace, MD[a] & Fritz Fuller, REMT-P[b]

[a]Department of Emergency Medicine, Madigan Army Medical Center, Ft Lewis, WA and [b]American Medical Response, Tacoma, WA

Study Objective: Determine rate of unnecessary (over-treatment) emergency medical services (EMS) intravenous (IV) line placements. We hypothesized > 10% over-treatment IV placement rate. More occurrences with transport times > 10 minutes, paramedic experience < 2 years, and when a paramedic student was present.

Methods: Consecutive EMS patients were prospectively followed to determine whether an IV was placed or not. Over-treatment was any patient with EMS initiated IV not used in the field or within 60 minutes of the emergency department (ED) stay for fluid bolus or medication administration. We analyzed data on placement and use of IV, ED initiation and/or use, EMS transport times, years of paramedic practice, and presence of a paramedic student. Proportions are expressed with 95% confidence intervals. All IV placements were at the discretion of the paramedic.

Results: Two hundred ninety patients over 34 days; 165 had IV initiated (147) or attempted (18). Twenty-nine percent ± 5% (84/290) of the patients received an over-treatment EMS IV. One hundred twenty-five patients had no EMS IV. Seven later required IV during first 60 minutes of ED stay. Under treatment rate was 2.4% ± 1.8% (7/290). Odds ratios (95% CI) are: transport times > 10 minutes, 1.3 (0.7-2.4), < 2 years of experience as a paramedic, 1.1 (0.4-2.7), and paramedic student, 2.4 (1.0-5.4).

Conclusions: Over-treatment rate was common at 29% (P<0.01). A paramedic student increased the odds (2.4) of over-treatment (P<0.05). Under treatment rate was 2.4%. Paramedics frequently over-treat with little under treatment.

Presenter: Fritz Fuller, REMT-P

Mentor: Steve Pace, MD

Continuity of Care and Patient Satisfaction in a Family Practice Clinic

Eric D. Morgan, MAJ, MC & Mike Pasquarella, LTC, MC

Faculty Development Fellowship, Department of Family Practice, Madigan Army Medical Center, Ft Lewis, WA

Purpose: Continuity is a tenant central to Family Practice. While short- and long-term continuity have both been associated with satisfaction in populations that select and easily change their providers, little is known about the importance of continuity in environments where patients are assigned a provider.

Methods: One-week waiting room survey on all Family Practice Clinic (FPC) patients. Responder's demographic characteristics were compared to a computerized record of the week's clinic visits. Results were analyzed using Chi-square, unpaired *t*-test and correlation matrixes. A multiple logistic regression was generated for patient satisfaction based on access, long-term continuity rates and satisfaction with the Primary Care Provider (PCP).

Results: One hundred ninety-six surveys were returned. Distribution rate was 61.6% with a response rate of 68.3%. While responders were more likely to be retired ($P<.05$), responders were not more likely to be seeing their PCP on the survey date ($P=.31$). For the immediate visit, most patients tolerate seeing any provider, with satisfaction only slightly diminished ($P=.08$). Patients desire greater PCP continuity as annual use increases ($r=.16$). Although the desire for continuity is not associated at all with FPC satisfaction (r=.05), obtaining long-term continuity is. Logistic regression of patient satisfaction reveals that 12% was determined by long-term continuity rates, 23% by PCP satisfaction, and 17% by how easy it was to make the appointment (R2=30). With high clinic use, PCP satisfaction and long-term continuity rates now account for 78% of patient satisfaction (R2=42). There is a subset of patients (13%) who value choice of appointment time or provider over continuity. Satisfaction is not diminished in this group despite poor long-term continuity rates. Patients who saw their PCP on the survey date average seeing their PCP twice as often in the long-term ($P<.0001$). However, it was much more difficult to see one's PCP than to see any provider ($P=.03$).

Conclusions: With high annual usage, satisfaction becomes increasingly dependent on achieving long term continuity with a provider the patient likes. While continuity is important, flexibility in allowing patients to see other providers and to change providers is also important. Continuity and satisfaction rates are linked with ease of appointment. Facilitating appointments is important if continuity is to occur for the majority of Family Practice patients.

Presenter: Eric D. Morgan, MAJ, MC

Mentor: Joseph Yetter, COL, MC

Experimental Design

Moderator: Katherine H. Moore, PhD

The category of "Experimental Design" encompasses the basic science projects. This type of research typically will investigate a fundamental principle of cell biology or physiology, and is the easiest in which to appreciate the values of hypothesis, objective, and experimental design. The importance of adherence to these values becomes clear in the ethical imperatives of clinical research. These ethical imperatives involve protection of research subjects, whether animal or human. Above all, rigorous experimental design facilitates the search for truth, aiding investigators in avoiding fatal flaws. These flaws may remain unrecognized and could lead to false conclusions. We have seen in the papers already presented today that the importance of a hypothesis, objective, and good experimental design is consistent throughout any research, including approach to managed care, military unique research, and medical education.

The range of topics and experimental models that were submitted is impressive. Mechanisms of inflammation are investigated in two studies, one using an in vitro human placenta model, the other a laboratory animal (mouse) model. Another animal model (young pigs) was used by the scientists developing new ways to treat airway injuries. One study utilized cells grown in dishes, but could be potentially applied to patients. Two studies have utilized human subjects to answer a clinically important question and lead to the development of new tests for cancer, or therapies to ease patient discomfort after surgery.

Some may view basic science research projects as less important or necessary in a setting such as Madigan compared to other types of research. However, another view is that basic science projects and the disciplined approach necessary for their success are a critical step in the training of physicians and nurses who then proceed to complete other projects and become the mentors for the next generation. The principles of study design, execution, and data analysis that are learned in a laboratory or carefully designed project utilizing human subjects are relevant to the success of any research project. As in industry, in medicine the time lag between an idea being in the realm of basic science and practical

application is becoming much shorter. I would not be surprised to find that some of the ideas presented in today's Experimental Design section will soon be applied to patient care. In many ways, researchers at Madigan are at the front of the wave that is leading the pathway of change in medicine.

The Effects of Lipopolysaccharide, an Inflammatory Stimulus, on Placental Production of Interleukin-6 in the Isolated Dually Perfused Placental Cotyledon

Richard K. Wagner, MAJ, MC[a], Christina Apodaca, MAJ, MC[a], Roger M Hinson, MAJ, MC[b], Byron C. Calhoun, Lt Col, MC[a], USAF, Katherine H. Moore, PhD[c], Roderick F. Hume, COL, MC[a]

[a]Department of Obstetrics/Gynecology, [b]Department of Pediatrics, and [c]Department of Clinical Investigation, Madigan Army Medical Center, Ft Lewis, WA

Objectives: Interleukin 6 (IL-6) is a multifunctional cytokine produced in variety of inflammatory conditions. It has been isolated from placental tissue, and increased levels in the amniotic fluid shown to predict intrauterine infection. No studies have examined the ongoing production of IL-6 in the isolated placental cotyledon. Our purpose was to determine if the isolated dually perfused placental cotyledon actively produces IL-6, and to investigate the effects of an inflammatory stimulus on this production.

Study Design: Two cotyledons from each of nine placentas were perfused. The intervillous spaces and fetal circulation of the control cotyledon were perfused with an oxygen-enriched Hank's Balanced Salt and Albumin solution. The intervillous space of the study cotyledon was identically perfused, but the fetal circulation received one of three different concentrations of Lipopolysaccharide, a potent inflammatory stimulus. Effluents from the fetal circulations of both cotyledons were collected at regular intervals and IL-6 concentrations subsequently determined using a commercially manufactured Enzyme Linked Immunosorbant Assay. Perfusion pressures within each group were recorded at regular intervals.

Results: Data was analyzed using repeated-measures analysis of variance. Interleukin-6 concentrations were identified and demonstrate a statistically significant increase over time in both the study and control groups (P–0.002). No statistically significant difference between the concentrations of IL-6 in the study and control groups is apparent (P=0.848) and no dose-dependent effects of LPS on IL-6 production are revealed in this experiment (P=0.709). There is no statistically significant difference in perfusion pressures between the study and control groups.

Conclusions: IL-6 is detectable in the venous effluents of the isolated perfused placental cotyledon and is produced in increasing quantity directly proportional to time. LPS does not appear to modulate the production of IL-6. Treatment with LPS is not associated with a significant change in fetoplacental vascular tone.

Presenter: Christina Apodaca, MAJ, MC

Mentor: Byron C. Calhoun, Lt Col, MC, USAF

Effect of a Perfluorocarbon on Interleukin-6 Secretion by Murine Peritoneal Macrophages

Victoria W. Cartwright, CPT, MC

Department of Pediatrics, Madigan Army Medical Center, Ft Lewis, WA

Background: Perfluorochemicals (PFC) when used for partial liquid ventilation have been noted to decrease pulmonary inflammation. Several in vitro studies have demonstrated that PFC decreased inflammatory mediator release, but this effect has not been well documented in vivo. We used a murine peritoneal model to determine whether PFC was pro- or anti-inflammatory. Specifically, we hypothesized that the PFC perfluorophenathrene would attenuate inflammation (as assessed by peritoneal lavage fluid IL-6 levels) when administered in combination with pristane, a potent stimulator of IL-6 production.

Methods: Groups of female BALB/c mice were injected intraperitoneally with either 0.5 ml of PFC (n=15), 0.5 ml of pristane (n=6), or 0.5ml each of PFC and pristane (n=14). Peritoneal lavages were performed at 5 and 7 weeks post injection, and lavage fluid IL-6 levels were measured with a commercial ELISA.

Results: IL-6 levels, expressed as mean (SD) in units of pg/ml were as follows: at week 5, PFC group 29 (42), Pristane 138 (86), PFC+Pristane 137 (117). At week 7, PFC group 42 (31), Pristane 120 (88), PFC+Pristane 124 (104).

Two-way ANOVA identified no significant intra-group differences between values obtained at weeks 5 and 7, but it did detect a significant between group effect. The PFC group had significantly lower IL-6 levels than either the Pristane ($P<0.01$) or PFC+Pristane group ($P<0.001$), but the IL-6 levels of the Pristane and the PFC+ Pristane groups were not significantly different ($P=0.99$).

Conclusions: Our data indicate that, in this mouse model, pristane induced IL-6 production by peritoneal macrophages was not attenuated by perfluorophenathrene. In fact, this PFC was mildly pro-inflammatory, though much less so than pristane. These results contrast with several in vitro studies which have demonstrated decreased inflammatory mediator production by PFC laden macrophages. Possible explanations for this include differences in the methods of inducing inflammation, the model used to assess inflammation, and the brand of PFC used.

Presenter: Victoria W. Cartwright, CPT, MC

Mentor: Roger M Hinson, MAJ, MC and Edward Carter, LTC, MC

Telomerase Activity in Solid Transitional Cell Carcinoma, Bladder Washings, and Voided Urine

Raymond S. Lance, MAJ, MC[a], Wade K. Aldous, CPT, MS[b], Jason Blaser, CPT, MC[c], J. Brantley Thrasher, MAJ, MC[a]

[a]Urology Service, Department of Surgery, and [b]Departments of Clinical Investigation and [c]Pathology, Madigan Army Medical Center, Ft Lewis, WA

Telomerase activity has been detected in a wide variety of human malignancies. It appears to be one of the fundamental ingredients necessary for cellular immortality. We sought to determine the incidence of telomerase activity in solid transitional cell carcinoma (TCC) specimens, benign urothelium, bladder washings, and voided urine from patients with TCC identified cystoscopically compared to controls.

Telomerase activity was measured in 26 solid bladder cancers, and 13 benign urothelial specimens using the telomere repeat amplification protocol (TRAP), a polymerase chain reaction (PCR) based assay. Telomerase activity was further measured in the centrifuged cellular material obtained from the bladder washings of 26 patients with TCC, and 40 with benign urologic disease found to have a normal cystoscopy. All patients with hematuria were additionally evaluated with an upper tract radiographic examination and found to be free of malignancy. Voided urine was likewise evaluated in 11 patients with TCC, 12 with benign urologic diseases, and 56 asymptomatic control subjects.

Telomerase activity was detected in 25/26 (96%) solid specimens, 21/26 (81%) bladder washings, and 6/11 (54%) voided urine specimens from patients with histologically confirmed TCC. In the control group, 2/13 (15%) benign urothelial specimens, and 2/56 (4%) voided urine specimens from the asymptomatic volunteer group demonstrated telomerase activity. Of those with benign urologic disease, 16/40 (40%) bladder barbotage specimens, and 6/12 (50%) voided urine specimens demonstrated telomerase activity. Sensitivity and specificity of telomerase as a marker for TCC in the bladder washings group was 81% and 60% respectively, and 54% and 50% in voided urine, respectively.

These data indicate that activation of telomerase is frequent in solid TCC and appears to be a sensitive marker in bladder washings of patients with TCC. We noted an unexpectedly high false positive detection rate in patients with benign urologic diseases, especially those with symptomatic BPH. Further study of a larger number of both bladder cancer patients and those at risk is necessary to determine if telomerase activity could play a role as a diagnostic and/or surveillance marker of TCC.

Presenter: Raymond S. Lance, MAJ, MC

Mentor: J. Brantley Thrasher, MAJ, MC

Effects of Tamoxifen on Telomerase Activity in Breast Cancer Cell Lines

Amber Marean, BS[a], Mary Jo DeHart, BS[b], Louis Matej, BS[b], Katherine Moore, PhD[b], Kenneth Bertram, LTC, MC[c], Wade K. Aldous, CPT, MS[b]

[a]Red Cross Volunteer (Department of Clinical Investigation), [b]Department of Clinical Investigation, and [c]Hematology/Medical Oncology Service, Department of Medicine, Madigan Army Medical Center, Ft Lewis, WA

Introduction: We tested the effects of Tamoxifen at four different concentrations with MCF-7 and MDA-MB-231 breast cancer cell lines. MCF-7 cells are a known estrogen receptor positive cell line, whereas MDA-MB-231 cells, previously thought to be estrogen receptor negative are now shown to have the estrogen receptor beta.

Methods: Both cell lines were grown in the presence of Tamoxifen 10-6 through 10-9 M for 10-day periods. Cells in separate flasks were harvested daily for determination of total cell number, protein was extracted for determination of telomerase activity, and RNA was extracted for Northern and RT-PCR analysis to measure expression levels of telomerase components and estrogen receptors.

Results: Total cell counts of both cell lines with 10-8 M Tamoxifen treatment were lower than control cells and other Tamoxifen treatments from days 4 to10. Telomerase activity levels from 10-8 M Tamoxifen treated cells were lower than controls and other Tamoxifen treatments from days 4 to10. All Tamoxifen treated cells showed recovery with cell growth and telomerase activity within 4 days except the 10-8 M treatment.

Summary: Tamoxifen has an effect on cell count and telomerase activity only within the 10-8 M concentration. Cells were able to overcome drug inhibition at all other doses after 4 days.

Presenter: Amber Marean, BS

Mentor: Wade Aldous, CPT, MS

Tracheal Mucosal Healing in Response to Moderate Mucosal Injury Induced by Expandable Metallic Stents

Keith Ulnick, CPT, MC[a], Jonathan Perkins, MAJ, MC[a], Kenneth Azarow, MAJ, MC[b]

[a]Otolaryngology Head and Neck Surgery Service and [b]General Surgery Service, Department of Surgery, Madigan Army Medical Center, Ft Lewis, WA

Background/Purpose: To assess tissue inflammation and wound healing from airway stenting with an expandable metallic stent in the pig (Sus Scrofa) trachea.

Method: A prospective, randomized, controlled study involving 32 young pigs, divided into 4 groups of 8 animals (7 experimental and 1control) was conducted. Under direct visualization, a stent was placed endoscopically after stent placement, Groups 1 and 2 underwent euthanasia 3 and 7 days, respectively. Groups 3 and 4 had stents removed on day 7 and were euthanized at day 14 and 21, respectively. Controls underwent bronchoscopy alone. Segments of trachea were evaluated grossly and underwent for Hemotoxin and Eosim and immunohistologic staining.

Results: Tracheal mucosa was minimally impacted by stent placement. Granulation tissue was noted at the proximal end of the stented segment in 90% of the animals. All granulation tissue disappeared after stent removal. Histopathology confirmed the endoscopic and gross findings. Tracheal growth and animal weight gain were unaffected.

Conclusions: Metallic stents induce minimal mucosal reactivity in the pig trachea, as compared to controls. When stents are removed there is resolution of inflammation and rapid wound healing. These findings illustrate the potential advantages of this type of stent as an adjunct in airway reconstruction.

Presenter: Keith Ulnick, CPT, MC

Mentor: Jonathan Perkins, MAJ, MC

The Effectiveness of 5-Hydroxytryptamine Type 3 (5-HT3) Receptor Antagonists in the Treatment of Narcotic Induced Intrathecal Pruritus: Ondansetron Versus Naloxone

Laura E. Francis, 1LT, AN

U.S. Army Graduate Program in Anesthesia, Madigan Army Medical Center, Ft Lewis, WA

Epidural narcotics are frequently indicated in the control of pain in postoperative patients. Pruritus with epidural morphine is reported in 41% to 100% of patients.

To date, naloxone is the treatment of choice to relieve this type of pruritis. Naloxone often reverses analgesia while having a shorter half-life than intrathecal morphine, thus requiring multiple doses to sustain relief from pruritis.

Several theories point to the role of seretonin (5-HT) in the regulation and transmission of nociceptive information including pruritis. Ondansetron, a 5-HT3 antagonist, may relieve pruritis with a single dose and will not reverse the analgesia of morphine.

The sample population for this study includes 120 OB/GYN patients presenting for nonemergent surgical procedures who's anesthetic plan calls for administration of intrathecal morphine (duramorph) for postoperative pain relief. Once informed consent is obtained, the patients are randomly assigned to medication administration groups (ondansetron or naloxone). Each patient receives duramorph 0.3 mg to 0.5 mg intrathecally.

Pruritis, pain, nausea, and headache are recorded each hour for 6 hours using a self-scored visual analogue scale. At the patient's request a standard pruritis relieving dose of naloxone 0.1 mg or ondansetron 4 mg intravenously is administered in a double blind manner. If the pruritis is not relieved by the first dose, a second dose may be repeated one time after 30 minutes have elapsed. Mean scores will be tallied and analyzed using an analysis of variance.

To date 14 patients have been recruited into the study. Only two have requested treatment for pruritis.

Presenter: Laura E. Francis, 1LT, AN

Mentor: Melissa Forsythe, LTC, AN

Case Reports

Moderator: Romeo Perez, COL, MC

The critical importance of the timely observation, thoughtfully researched, and carefully presented for review by ones peers remains the keystone for most of the advances in clinical investigation and clinical practice. It is through these little discoveries that specific hypotheses can be formulated and tested in well-designed clinical studies. New diagnostic methods or therapies validated through clinical trials. All of this must begin with the precise question: Why did this happen to my patient? What does it mean to others?

"In the beginning is the end, and in the end the beginning" (TS Elliot). So we present a few of the many significant case reports presented each year from the Madigan community. Last of the day, but no less important. The most significant contributions made by many distinguished academic physicians were simple case reports. Think of congenital rubella. Think of Thalidomide.

We began the days presentations with marching feet, and we end with purple toes. We chase a BB down the airway of a distressed patient. And we discover that a proven medical modality might expose our female soldiers to an unintended consequence. What does each case reveal about the importance of the process of the practice and documentation of medicine? What cases will be measured by great gains?

Madigan Research Day should provide a forum for the significant positive growth in attracting grant support, new ideas, coinvestigational teams, and mentors for our young investigators. I appreciate your outstanding achievement and your willingness to support the success of the First Annual Madigan Research Day.

Decline in Bone Mineral Density with the Development of Stress Fracture in a Female on Depo-Provera®

Gerald J. Harkins, CPT, MC[a], Gary D. Davis, COL, MC[a], Joseph R. Dettori, COL, SP[b], Milo L. Hibbert, COL, MC[a]

[a]Department of Obstetrics and Gynecology and [b]Physical Therapy, Physical Medicine & Rehabilitation Service, Madigan Army Medical Center, Ft Lewis, WA

Depot medroxyprogesterone acetate (Depo-Provera®) is a popular contraceptive choice among young, physically active women. However, its administration has been linked to a relative decrease in estrogen levels. Since bone resorption is accelerated during hypoestrogenic states, there has been growing concern about the potential development of osteoporosis and fractures with the use of this contraceptive measure.

A physically active 33-year-old woman demonstrated a 12.4% drop in femoral neck bone mineral density (BMD), 6.4% drop in lumbar BMD, and 0.8% drop in total BMD with the subsequent development of a tibial stress fracture while on depot medroxyprogesterone acetate. Bone mineralization rapidly improved and the stress fracture resolved with the discontinuation of the medication.

The long-term effects of depot medroxyprogesterone acetate on bone mineralization in physically active women should be more thoroughly evaluated.

Presenter: Gerald J. Harkins, CPT, MC

Mentor: Martin Ladwig, MAJ, MC

Combined Rigid and Flexible Endoscopic Removal of a Steel BB from a Peripheral Bronchus: a Case Report

Joseph Ruegemer, CPT, MC & Jonathan Perkins, MAJ, MC

Otolaryngology/Head and Neck Surgery Service, Department of Surgery, Madigan Army Medical Center, Ft Lewis, WA

Removal of aspirated foreign bodies (FB) in the peripheral tracheobronchial tree is challenging, particularly for sharp, or smooth nonfood objects. The FB may become lodged from progressive migration, small size, and repeated attempts at removal. Various removal techniques have been described. We present an alternative technique for removal of a BB impacted in the peripheral lung. The location and nature of the FB required a unique approach for successful removal. The combination of rigid and flexible bronchoscopy provided excellent visualization and maneuverability, ultimately avoiding open surgical removal. This case emphasizes the advantages for bronchoscopists to be familiar with both rigid and flexible techniques.

Presenter: Joseph Ruegemer, CPT, MC

Mentor: Jonathan Perkins, MAJ, MC

Purple Toes

Brian P. Mulhall, CPT, MC

Internal Medicine Service, Department of Medicine, Madigan Army Medical Center, Ft Lewis, WA

Seventy-two year old Black male with recent PMH significant for right Middle Cerebral Artery Cerebrovascular Accident (started on Coumadin) with outpatient course complicated by DVT (aspirin initiated). Pt. Developed a "cellulitis" at an interavenous site with 2 of 6 screening cultures positive for Staph aureus, and a clinical picture thought consistent with endocarditis. However, all further cultures were negative, as was TTE and TEE. Tagged white blood count (WBC) scan showed diffuse lower extremity endothelial inflammation thought secondary to "bacterial seeding," so pt. received a full 6 week course of antibiotics. Prior to scheduled (repeat) tagged WBC scan, pt. developed symptoms consistent with Congestive Heart Failure. His step-wise, progressive renal failure now corresponded to a markedly depressed Left Ventricular Ejection Fraction (LVEF) (15% vs 40% 1 month prior). On hospital day 8, the patient developed painful, necrotic lesions on the toes of both feet thought consistent with embolic phenomenon. All blood cultures were negative, as was evaluation for vasculitis. Due to suspicions regarding cholesterol embolization, a skin biopsy was performed-which was negative. Given a high clinical suspicion, anticoagulants were stopped. Patient's creatinine stabilized and repeat ECHO showed a return of his LVEF to 40%. At his request, patient was discharged to home. Clinically, he worsened; due to his progressive lethargy, he was again taken to a hospital where he was found to be markedly azotemic. He proceeded into cardiac arrest and could not be resuscitated. Autopsy confirmed the diagnosis of cholesterol microembolization syndrome (CMES).

After case presentation, the diagnosis of CMES (typical presentation and epidemiology) will be discussed; the interesting facets (uncommon presentation in blacks, the endothelialitis, the temporal cardiomyopathy) will be highlighted; and recent developments and considerations regarding pathophysiology will be introduced.

Presenter: Brian P. Mulhall, CPT, MC

Mentor: Joseph Morris, LTC, MC; Maureen Arendt, MAJ, MC

Women's Healthcare Initiative Research Center

CPT Elisabeth Gussenhoven[†]
LTC Carroll Ray Dotson[††]
COL Roderick Hume[†††]
COL Romeo P. Perez[††††]
Carol Campbell, MA[†††††]

Historically, clinicians and researches defined "Women's Health" narrowly as reproductive health. Women's health may be emerging as a separate specialized field within medicine. This new discipline embraces an expanded definition of women's health and women's health research; one which incorporates cellular, systemic, individual, and societal perspectives. Interdisciplinary research that facilitates this needed integration is only now emerging. The integration and consolidation of all Women's Health Initiatives into one area allows the best resource-sharing potential–clinically and administratively.

What is Women's Health Research?

We believe that research is fundamental to changing how we care for women. We have seen how women's health research has grown from its early emphasis on reproduction to a much more sophisticated arena. Now we are looking at a wide variety of women's health issues. These include the effects of the menstrual cycle on diseases and their treatment, illness and health in older women, environmental causes of disease, and behavioral research. This new discipline embraces an expanded definition of women's health and women's health research, one that integrates basic and social sciences and describes the health of women across the life span – from birth through childhood, adolescence, adulthood, maturity, and old age.

Background

As the premiere women's health specialists for the 21st century, Obstetrics and Gynecology (OB/GYN) are now taking the lead in today's movement toward expanding the definition of women's health. The Department of Defense (DOD) has given its support to this movement with its Women's Health Initiatives at Madigan Army Medical Center (MAMC) that have resulted in funding for pelvic floor relaxation research as well as for the Breast Cancer Prevention, Education, and Detection Initiatives. The increased emphasis in these areas enabled us to broaden our approach to women's health and enhance the readiness of the active duty female soldier. In addition to these programs, MAMC's expanded complex genetics, prenatal diagnosis, and fetal therapy services further developed the areas of women's health we are concentrating on. This necessitated evaluation of ways to consolidate and integrate all of the Women's Health Initiatives to provide adequate clinical and administrative support.

Mrs Lynn Brown, wife of MAMC Commander BG George Brown with COL Romeo Perez, Chief OB/GYN, at the Women's Healthcare Initiative Research Center Open House.

Author information immediately follows this article.

Consolidation of Women's Health Initiatives

The MAMC celebrated the opening of the Women's Healthcare Initiative Research Center on 28 May 98. The center is dedicated to the memory of COL Harold E. Harrison, the first Chief of OB/GYN Services at MAMC who served in the position from 1949 to 1964. Located on the north side of the third floor in the Nursing Tower and commonly referred to as 3 North, the center developed as a result of the realignment movement within Madigan. As nursing wards consolidated in the shift from emphasizing healthcare in an inpatient to an outpatient setting, areas of the hospital such as 3 North were redesignated for specialty care services.

After the establishment of expanded complex genetics, prenatal diagnosis, and fetal therapy services, it became evident that there was a need to consolidate these activities in order to allow the best sharing of clinic and administrative resources. The available space on the third floor of the Nursing Tower was an ideal location for specialty OB/GYN services due to its proximity to the Labor Delivery Unit also located there. The Antenatal Diagnostic Clinic and the Maternal-Fetal Medicine Fellowship were the first specialties to relocate to 3 North. These programs enhance the resources available to expectant mothers, especially those with high-risk pregnancies.

The next addition was the Breast Cancer and Genetics program. Congressional funds from the DOD Women's Health Initiatives support this program. It is aimed at the prevention and early detection of breast cancer as well as at educating women about the disease. The genetic portion of the program explores the feasibility of using a contract laboratory for consultative service and technological support for clinical research in identifying breast and ovarian cancer susceptibility genes (BRCA 1 or II), and to establish service for genetic education of healthcare professionals, beneficiaries, individual counseling, and testing.

The subspecialty of Urogynecology and Reconstructive Pelvis Surgery is rapidly emerging and of particular importance to military healthcare. With The Surgeon General of the Army's approval of a 3-year fellowship training program in Urogynecology and Pelvis Reconstructive Surgery and a successful accreditation survey by the American Board of OB/GYN, focus on research and development in pelvic disorders unique to the female soldier will be undertaken in the Women's Healthcare Initiative Research Center. The nature of training and exercise injuries, as well as pelvic floor injuries sustained by the female soldier in childbirth deserves much more study. Attention will be directed to effective methods of preventing these injuries as well as more effective surgical and nonsurgical treatment modalities.

The main goal of consolidating health programs for women in the Women's Healthcare Initiative Research Center is to permit the sharing of administrative support while enhancing the medical education and research objectives of our residents and fellows. To demonstrate the numerous and varied services that this center can provide, each area–to include the Labor and Delivery unit as well as Telemedicine–created a display for the Open House. Information was available from how to detect breast cancer and how to conduct physical training safely as a pregnant solider, to how Telemedicine can permit doctors at remote sites to connect with their peers at MAMC for consultations without having to transport the patient. In addition, visiting medical research foundations were on hand to provide information on how they can support MAMC's mission of providing quality care within budgetary collstraints.

Colonel Harold E. Harrison was the Chief of OB/GYN Services when the first OB/GYN Residency Program was established and approved at Madigan in 1957. The first resident, CPT William McIlroy, began on 1 Sep 58 and graduated on 31 Aug 61. Colonel Harrison was a great promoter and supporter of residents and understood the importance of resident research as part of a graduate medical education. It is fitting that as Madigan celebrates the 40th year since the official start of the OB/GYN residency program and expands its areas of resident research to include urogynecology that the Women's Healthcare Initiative Research Center is named after him.

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A Comparison of MMPI Profiles: Combat Zone vs Stateside Cohorts

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Distress among Operation Desert Storm (ODS) soldiers during the post-combat (redeployment) phase provides important information regarding adjustment after an acute crisis. Minnesota Multiphasic Personality Inventory (MMPI) profiles of ODS soldiers obtained 2 to 6 months after the cease-fire were compared with those of a matched control group from a military post in the continental United States (CONUS). Significant elevations of 16 of 22 clinical and supplemental scales were found for the ODS soldiers when compared to the CONUS group suggesting pronounced distress and irritability despite the absence of threat or ongoing hostilities. It was concluded that the psychological challenge to individuals continues beyond the acute crisis phase of disaster, and that research as well as planning activities must address this transitional period.

The detrimental effects of disaster relief work on the psychological well-being of emergency personnel has led to a number of reports on stress and coping during these experiences. While these reports have highlighted the intense and often overwhelming demands on the psychological resources of the workers, they have also identified less apparent sources of stress including organizational conflict, role confusion, and ambiguous goals that evolve as the focus shifts from crisis to rebuilding.[1] However, there is little information regarding the nature of distress experienced during readjustment from crisis to rebuilding.

Much of the information available on the human response to disaster and violence has come from reports of soldiers' adjustment to war. Examinations of military combatants have generated two areas of research regarding adjustment: immediate adjustment and long-term sequelae. Acute responses to combat exposure (combat stress reactions) and coping degradation resulting from continuous involvement in combat operations (battle fatigue) involve crisis phase adjustment to the extraordinary sensory experience, sense of threat, and reduced personal control of the war environment.[2] Long-term adjustment to the experience of war requires that soldiers assimilate their experience into some acceptable set of memories that does not interfere with their re-entry into a peacetime environment. Failure to do so can result in the ruminations, intrusive recollections, avoidance, and hyperarousal often described as post-traumatic stress disorder. In the case of both immediate and long-term adjustment described above, the stressors arise out of the disquiet of combat.

Another period of challenge to the coping resources of soldiers that is easily overlooked exists during the "redeployment" phase of war–that period following the acute crisis of combat during which they begin the tedious work of packing up and preparing to return to a peacetime environment. Understanding the nature of distress during this phase is necessary before prevention and intervention strategies can be considered. During this post-combat/redeployment period, soldiers are often engaged in the mundane work of repairing and restoring the infrastructure of the local culture, cleaning equipment, moving to ports for redeployment, and performing routine duties. These activities are necessary steps in the process of "going home" and typically involve several months of tedious activity. As task demands are perceived as less urgent and there is less public attention, the enthusiasm and sense of purpose becomes muted. Moreover, sources of stress that were generally ignored during the preparation and execution of combat-related activities become more vexing as soldiers settle into a routine that allows them time to think about their situation. Overcrowding, restricted privacy, the formation of cliques, open-ended or vague estimates for return home dates, separation from family, renewed interest in home front dilemmas, and nostalgia for a familiar milieu characterize the potential irritants experienced by solders in the redeployment theater.

Marren noted that service members referred for psychiatric evaluation after the cease-fire in Korea tended to be dysphoric, ruminative, and irritable (in contrast to the anxious, acutely disoriented

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presentations he observed during combat).[3] Jones reported increasing rates of antisocial behavior among some soldiers in Vietnam as American involvement in direct combat was curtailed during Vietnamization, and service members were assigned to support and maintenance duties.[4] Similarly, anecdotal reports of anxiety, depression, poor morale, and antisocial behavior have been reported for some service members serving in the Persian Gulf after the ODS cease-fire.[5] To date there has been no objective evaluation of these complaints. Do they simply reflect disgruntlement among individuals who feel that they have done their duty and want to go home? Or do the complaints reflect an underlying core of distress that remains after the heightened arousal of preparing for and participating in a battle? The present study compared MMPI profiles of service members who reported for evaluation and treatment while on duty during ODS with a stateside group matched for age, sex, and military rank who reported for treatment at a mental health clinic in CONUS. The purpose of this comparison was to evaluate differences in the presentations of these groups and to identify unique characteristics of each, especially with respect to the profiles of individuals adjusting to the redeployment environment in the Persian Gulf after combat.

Method

Subjects. Subjects consisted of 28 military service members. Fourteen soldiers were evaluated while serving in the Persian Gulf during the redeployment phase (May to August 1991) of ODS. These 14 soldiers were a subset of the 158 service members evaluated by the senior author. The ODS referrals typically presented with sleep disturbances, depression, and interpersonal conflicts (peer-peer or authority). Complaints focused on separation from family, devaluing the worth of post-combat duties, inability to control or predict their return home date, and continued anxiety about their combat experiences. Three of the 14 ODS subjects presented histories consistent with personality disorders (one passive-aggressive and two antisocial). A second group of soldiers seen during the same period at a military community mental health clinic in the United States were identified and matched with the ODS soldiers for age, sex, and military rank. These soldiers usually presented with complaints of mild depression, dissatisfaction with duty assignment, or family conflicts. Among the 28 subjects in this study, four were female, four were minority group members (African-American, Hispanic, other than Caucasian), and 10 were above grade E5 (Sergeant/Petty Officer 2d Class) with an average age of 25.29 years (SD = 6.48).

Procedure. Subjects in both groups (ODS and CONUS) completed the MMPI, Form R, as part of their diagnostic examinations. T-scores (raw + K formula) were computed for each subject for the validity and clinical scales, L-F-K, and scales one through zero, as well as for nine supplemental scales that were selected on a priority basis for their theoretical and practical relevance to the study. That is, scales were selected that addressed content areas frequently identified as contributing to stress among soldiers (poor morale, conflict with superiors, substance abuse, family concerns) and areas of distress identified by soldiers themselves who were interviewed in the Persian Gulf (absence of control, suppressed anger, suspiciousness, oversensitivity, family concerns).[4,5] The scales included Control,

	ODS		CONUS	
Scales	**Mean**	**SD**	**Mean**	**SD**
L	50.36	6.54	57.99	10.04*
F	70.86	15.78	55.79	9.33*
K	49.14	7.96	57.50	8.74**
1-Hs	64.71	18.77	57.21	11.82
2-D	82.79	18.73	56.93	10.92***
3-Hy	66.86	10.86	58.36	9.48*
4-Pd	79.64	12.07	66.43	13.40**
5-Mf	62.50	11.31	60.29	9.79
6-Pa	73.57	15.01	59.93	12.32**
7-Pt	80.93	20.50	58.07	12.74**
8-Sc	83.79	22.71	61.57	12.32**
9-Ma	70.29	9.40	63.71	6.87*
0-Si	59.71	11.32	49.64	8.99**

* $P<.05$ ** $P<.01$ *** $P<.001$

Table 1. MMPI Clinical Scale and Comparisons of ODS and CONUS Groups

Scales	ODS		CONUS	
	Mean	SD	Mean	SD
Control	59.64	14.69	43.71	9.41*
Alcohol	65.64	9.44	65.07	9.42
Overcontrolled Hostility	51.07	10.15	63.36	13.63*
Poor Morale	59.00	10.31	45.93	9.50*
Family Problems	69.57	16.43	53.57	10.84*
Authority Conflict	53.07	10.45	51.29	10.39
Persecutory Ideas	67.64	17.18	58.64	16.36
Poignancy	67.64	12.54	49.00	11.02**
Naivete	50.07	7.42	53.93	11.10

*$P<.05$ **$P<.01$ ***$P<.001$

Table 2. MMPI Supplemental Scale Comparisons of ODS and CONUS Groups

MacAndrew Alcoholism, Over-Controlled Hostility, Poor Morale, Family Problems, Authority Conflict, Persecutory Ideas (PA1), Poignancy (PA2), and Naivete.[6-10] Scale means and standard deviations were computed for both groups with data further subjected to comparisons by Student's *t* tests for all relevant scales. These comparisons are found at Table 1 for clinical scales, and Table 2 for supplemental scales.

Results and Discussion

Comparison of T-scores for ODS and CONUS soldiers indicated significantly greater elevations for the ODS sample across 16 of 22 MMPI scales. The ODS service members demonstrated a significant F-spike on MMPI validity scales, while the mean CONUS service member validity profile was flat and unremarkable. Despite F-scale elevations above 70T for the ODS sample, profiles were not considered invalid. No F-scale elevations exceeded 100T and ODS service members did not appear to be simulating or exaggerating psychopathology (Gough Dissimulation Scale x = 50.71, SD = 3.67).[11] Analysis of group means on the 10 clinical scales revealed significantly greater elevations on eight scales for the ODS group with mean scores on six scales rising above 70T (Table 1). In contrast, no CONUS mean scores were above 70T. There were no differences between groups on scales one and five with elevations for both scales falling below 70T. These results were not unexpected in that scales one and five often reflect habitual ways of responding to the environment that are not typical of individuals attracted to the conservative milieu of the military. Comparisons of mean supplemental scale T-scores revealed significant differences on five of the nine scales examined (Table 2). The magnitude of these differences was less pronounced than that found among the 13 traditional MMPI scales and no elevations rose above 70T for either group although the ODS group scores regarding family problems and suspiciousness/sensitivity (PA1 and PA2) approached the clinically significant range.

Service members presenting for psychological services in the Persian Gulf 60 to 120 days after the cease-fire continued to report significantly more distress than soldiers presenting during the same period at military mental health clinics in CONUS. While differences on individual scales are useful regarding the presenting complaints of the ODS soldiers and their CONUS cohorts, profile characteristics are often more informative in gaining a coherent sense of the groups at the time of their referral. The mean Welsh Code for the ODS group profile (827"469 '315-01 L/F'K:) was considerably more disturbed than the CONUS group profile (4985-

63712/0: LFK/).[12] F-scale elevations emphasized the severity of psychological distress expressed by the ODS service members during clinical interviews. The 827 code type described this group as dysphoric with severe anxiety, ruminative introspection, and impaired thinking. At a minimum, this profile would be associated with admission of considerable inner turmoil with a sense of powerlessness to alter circumstances, and parallels the descriptions of combat stress casualties in the past who complained of depression, insomnia, psychosomatic symptoms, fatigue, and anger.[4] A clinically significant difference with most reports of combat stress reactions is this group's apparent conflict with authority and hostility regarding authority. Clinical experience with these soldiers suggests that this rebellious posture is a redeployment theater phenomenon. That is, service members who remain in theater during redeployment may grow dissatisfied with their duties, exacerbating their residual tension from previous combat activities. Clinical interviews with these service members supported this view. In contrast, CONUS soldiers referred for mental health intervention present MMPI profiles suggesting mild irritability and restlessness with evidence of some authority conflicts. The profiles are consistent with the adjustment disorder diagnosis that most of these soldiers (N=12) received, and reflect transient situational distress that resolved with minimal therapeutic intervention. The profiles for ODS soldiers surveyed in this study are similar to trauma configurations reported for both combat veterans and civilian disaster victims.[13] They suggest that (1) the psychological demands imposed by a disaster like combat does not abate when the immediate crisis is resolved; and (2) the seeds for chronic maladjustment are evident soon after exposure to the disaster (depression, apathy, authority conflict).

The situational factors that contribute to this continued distress are not well understood. It is likely that the phase following crisis has inherent stressors of its own that either impede readjustment or generate new coping challenges for individuals whose psychological resources are depleted. While many have recognized the need for debriefing soldiers after combat, and relief workers after disasters, there has been little attention given to the ongoing psychological challenge of working during the redeployment/rebuilding phase of catastrophic events.[4,14] It appears that this is a critical transitional period in determining individual adjustment, and worthy of attention by research and disaster relief planners.

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"...Above and Beyond the Call of Duty"

Remembering U. S. Army Medical Department Regiment heroes

Ron Still†

During the Spanish-American War, there was only one Congressional Medal of Honor awarded to a member of the Army Medical Department. Captain James Robb Church won the Medal of Honor for his actions as a Regimental Surgeon with the First United States Volunteers, better known as the Rough Riders, at Las Guanimas, Cuba, on 24 June 1898. Major General Leonard Wood, who had formed and commanded the Rough Riders at the beginning of the war, had recommended Captain Church for the nation's highest honor on 29 March 1899. Wood had the support of President Theodore Roosevelt, General Joseph Wheeler, and General S.B.M. Young; however, none of their recommendations stated that they had witnessed Church's actions, thus he was not awarded the Medal of Honor. He was, however, recommended for promotion to Brevet Captain, which was approved. On 6 February 1903, Major General Wood again recommended that Church be given the award, and stated that he did witness the heroic acts. Based on the second request, Church's Medal of Honor was approved.

Captain Church's citation read:

AWARD OF THE MEDAL OF HONOR

For conspicuous gallantry and intrepidity in action at the risk of his life above and beyond the call of duty

Assistant Surgeon, 1st U.S. Volunteer Cavalry, at Las Guasimas, Cuba, 24 June 1898. In addition to performing his duties pertaining to his position, voluntarily and unaided, carried several seriously wounded men from the firing line to a secure position in the rear, in each instance being subjected to a very heavy fire and great exposure to danger.

In his initial recommendation, Major General Wood provided a much more detailed explanation of CPT Church's heroic deeds:

"During the heat of the action, Dr Church came onto the firing line repeatedly and in addition to giving the men the necessary surgical assistance, took some five of them on his back and carried them under a very heavy fire and with the greatest exposure to himself, to the rear. His services might have been legitimately considered ended, for the time being, in giving them the best possible surgical care and such assistance as he could render on the spot; but in addition to this, he performed the duty above specified, carrying the men several hundreds yards over an elevated ridge in the open, displaying in so doing, the greatest gallantry and disregard for his own life in his efforts to remove the wounded men to a position of safety where greater assistance could be furnished them. I know of no officer engaged in the campaign, at least none came under my observation, whose conduct was more deserving of recognition by the granting of a Medal of Honor."

President Theodore Roosevelt, then Governor of New York, also supported Wood's recommendation and stated what he had heard about Church's actions on the battlefield:

"I was not an eyewitness of Dr Church carrying the wounded men on his back, but I heard of it from a dozen eye witnesses within half an hour of the occurrence, and after the San Juan fighting, I saw him when he had pushed his hospital right up to the front and was taking acre of our wounded men, he himself being sick with the fever at the time. Throughout the remainder of the siege, he continued to do far more than his duty, although himself often as sick as the men he attended. I most warmly join in the recommendation for a Medal of Honor for him; he was one of the very best men in our regiment."

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Enrollment Based Capitation: Its Use in the Military Health System

MAJ Kyle D. Campbell†

The Military Health System (MHS), like the rest of the United States, is actively seeking ways to contain the growing cost of healthcare delivery. One way that the MHS is seeking to accomplish this goal is through the implementation of enrollment based capitation (EBC). The EBC is the system designed to drive the distribution of Defense Health Program (DHP) funds to the military services based on the number of TRICARE Prime enrollees at the Service's medical treatment facilities (MTFs). This dollar amount is then adjusted based on the MTF's purchasing (referrals) and selling (treating individuals who are not TRICARE Prime enrollees at that specific MTF) of healthcare services. The EBC is based on the concept of capitation which is the prepayment for services on a per member per month (PMPM) basis that may be varied based on factors such as age or gender of the enrolled population.[1] The two most critical aspects of EBC are the maximization of TRICARE Prime enrollees and the establishment and maintenance of quality data integrity. The EBC will provide monthly scorecards comparing target or budget enrollment, space-available, and care purchased outside the facility to actual "production." This may result in a shifting of resources and will favor the MTF commander who has the best data integrity and has maximized the number of TRICARE Prime enrollees within that facility. With EBC, the MHS can dramatically improve the financial efficiency and effectiveness with which they deliver healthcare.

Introduction

The MHS is striving to provide more financially efficient and effective care to their beneficiaries by focusing on maintaining wellness. Accomplishing this paradigm shift in the face of ever-shrinking resources requires many changes in the way the MHS attempts to execute its mission. This article will address one of the most critical changes: the use of EBC in the MHS. It will discuss the history of capitation in the MHS, the origins and three primary functions of EBC, and the importance of data integrity to the implementation of EBC.

The Orignins of EBC

Prior to 1994, the military based healthcare budgets on historical workload and resource consumption trends. This created the incentive for the MTF commander to generate greater and greater workloads. Each increase in workload brought with it an increase in budget without a mechanism or metric for determining the efficiency or necessity of the increased workload. To achieve the efficiency that today's resource constrained environment demands, "healthcare providers must be motivated to integrate into practice improved financial, clinical, managerial, and preventive aspects of healthcare."[2] The implementation of TRICARE, the military's triple option managed care program, is one of the tools that will assist in motivating providers to become more efficient. The motivation to develop EBC stems from the necessity to enable MTF commanders to have full accountability for all the resources used by their TRICARE Prime enrolled populations.[3] With TRICARE and EBC, the MHS seeks "to improve resource utilization by changing attitudes where everyone, including healthcare providers, pursues or provides cost-effective care."[4]

Definition of Capitation. The cornerstone of EBC is the utilization of capitation. Capitation is the prepayment for services on a PMPM basis that may be varied based on factors such as age or gender of the enrolled population.[5] Capitation is further explained as "the shifting of risk, and therefore medical management responsibility, to physicians in exchange for a flat, per-member payment, usually in monthly allotments."[6] The key aspect of capitation in the MHS is that it provides the MTF responsible for providing healthcare services to a defined population with a predetermined and pre-paid amount of resources to accomplish the mission. The MTF commander may then "determine how best to allocate those resources among the full spectrum of healthcare services."[7] Capitation allows the MTF commander a greater degree of accountability over the facility budget and the care provided to the beneficiaries. This facilitates an improvement in the quality of care provided as well as the efficiency with which that care is provided.

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Capitiation and its Prevalence in the Civilian Sector. Capitation exists in many different forms in the civilian sector. Just as with the MHS, "capitation eliminates the fee-for-service (FFS) incentives to overutilize and brings the financial incentives of the capitated provider in line with the financial incentives of the Health Maintenance Organizations (HMO)."[8] A great deal of attention is paid to this shifting of incentives from the historically higher than necessary utilization rates of FFS to the lower utilization rates of capitated systems. This leads to many disagreements among providers, payors, and analysts.

Many individuals argue that capitation is useful because it rewards the physician for management of the patient's care, rather than piecemeal payments for each individual treatment or test. Likewise, capitation tends to shift the physician's focus to preventative measures as no additional payments are received for treatment of serious illnesses.

Many other individuals argue that capitation creates problems in the healthcare system because it shifts the physician's focus to enrolling high numbers of patients and thus creates high patient-physician ratios. This leads to higher profits for physician groups but can also create problems in access to care for the patients. These same individuals tend to argue that capitation creates the potential for undertreatment. The incentive for the physician is to minimize the number of costly tests and treatments provided in order to maximize profits.

In general, capitation seems to have as many ardent supporters as it does critics. With the tremendous growth of HMOs, one would expect to see capitation in the vast majority of civilian healthcare organizations. Surprisingly, the literature shows a wide disparity between estimates of how widespread the use of capitation is in the civilian sector. PacifiCare of Colorado estimates that half of the dollars they spend on healthcare are now capitated to medical groups and that by the year 2000 they will have increased that amount to over 80%. They further explain that they have experienced more positives than negatives with capitation and that, when executed properly, capitation is a win-win situation for patients, doctors, and HMOs.[9]

David N. Gans, director of survey operations for the Medical Group Management Association (MGMA), found in a 1997 survey of the MGMA members that while 41.3% had capitation contracts, these contracts accounted for a small share, 10% or less, of their revenue.[10] These apparent contradictions are explained in part by the wide variety of types of practices and the different forms of capitation. As an example, while a HMO may choose to capitate its payments to an Independent Practice Association (IPA), the IPA may then choose to (be forced to) pay it's physicians on a discounted FFS or salary basis. Managed Care Magazine interviewed Consultant Peter Kongstvedt, MD, who explained that the use of capitation is actually increasing, albeit quite slowly.[11] This is mainly because there is more economic value in capitation than in other remuneration methods. One key indicator for the entire healthcare industry is the status of the two largest Government payers, Medicare and Medicaid, who despite some tentative steps in the direction of capitation still pay mainly on a FFS basis.[12]

In attempting to compare the different types of capitation systems to each other, one must remember the words of Alan Hillman, MD, MBA, Director of the Center for Health Policy at Penn's Leonard Davis Institute of Health Economics. Mr Hillman explained that "there is just no generalizing about capitated payment schemes these days: if you have seen one of them, you have seen one of them."[13]

History of Capitation within the MHS. The concept of using capitation within the MHS was first recommended as early as 1975 in a report directed by the President of the United States and conducted by the Office of Manpower and Budget. The next push for the use of capitation occurred in 1990 when COL Douglas Braendel proposed a model for the reengineering of the MHS.[14] His model included four key elements. First, enrollment would be mandatory and beneficiaries would be required to choose an enrollment option and remain in that option for 1 year.

Second, he proposed using a capitation method based on the number, age, and sex of enrollees in each catchment area. In conjunction with capitation, Braendel recommended that CHAMPUS dollars be included in the funding of each MTF. This stopped MTF commanders from avoiding the financial responsibility for the cost shifting of eligible beneficiaries. His model further recommended charging the costs of referral care between MTFs and Medical Centers. Braendel's proposal for utilizing capitation was accepted and incorporated by the Army Medical Department during fiscal year (FY) 92. In FY 95, a similar method was adopted by the Department of Defense Health Affairs (HA).

The third major element of the Braendel model was the provision of a Primary Care Provider (PCP) to every enrolled beneficiary. The fourth and final major element of the Braendel model was full implementation of a Utilization Management

program.[15] Virtually the entire Braendel model has now been adopted and as shall be seen in this article, COL Braendel played the major role in developing EBC.

The MHS, however, did not *fully* implement the use of capitation until FY 94. The MHS began using a TRICARE capitation model in FY94 to allocate DHP funds to the three services to serve as the basis for budget allocations to MTFs.[16]

The TRICARE capitation model was part of a three-pronged approach combining the Managed Care Support Contract (MCSC) and the establishment of 12 Lead Agent regions. The MCSC was established to contract for and provide civilian healthcare services within each of the Lead Agent regions. Lead Agents are tasked with overseeing the delivery of care within regions with multiple or overlapping catchment areas. This TRICARE capitation model of 1994 serves as the very foundation for EBC.

A Discussion of EBC

What is EBC? The EBC is the system which drives the distribution of DHP funds (dollars) to the military services based on the number of TRICARE Prime enrollees at the Service's MTFs. This dollar amount is then adjusted based on the MTF's purchasing and selling of healthcare services.

The MTFs EBC is the most advanced and newest generation version of the capitation methodology utilized by the MHS. The intent is for EBC to serve as the cornerstone of our efforts to compete for healthcare dollars in light of the emerging national healthcare reform movement. Many powerful individuals have recognized that the need to improve efficiency in the healthcare marketplace includes the delivery of military medicine.

To facilitate these efforts at improving efficiency and assist in the development of appropriate capitation rates, MTFs are beginning to utilize activity based costing (ABC). "This technique identifies the relationship between an activity and the resources needed to complete it and then assigns costs to those resources consumed by the activity."[17] The use of ABC assists in the implementation of EBC to facilitate the realignment of the financing mechanisms with the operational aspects of the TRICARE program. To meet the challenge of managing an enrolled population, MTF commanders must fully understand the total costs of providing care to their specific enrolled population. "The MTF commanders will be empowered through EBC to provide high quality, appropriate, and cost-effective healthcare to their beneficiaries."[18] Critical to this empowerment is that, for the first time, MTF commanders will have a full understanding of exactly which TRICARE Prime beneficiaries they are responsible for and the amount of funding that they are receiving per Prime enrollee. Concurrently, the MTF commanders will be held accountable for all resources needed to support the enrolled beneficiaries. This will include the care that the MTF has to purchase from other providers.[18]

The EBC is a subcomponent of the overall MHS managed care strategy. This strategy seeks to integrate the demands of peacetime healthcare with the critical readiness mission. The EBC provides the needed link between the MTF, Lead Agent, and the MCSC to execute the integration of these two essential missions.

Three Primary Features. The three key or primary features of EBC are capitation funding, the purchasing, and the selling of healthcare. Capitation refers to the PMPM payment earned by the MTF for each TRICARE Prime enrollee at that MTF on the 1st of each month.

The purchasing of healthcare services refers to situations where the MTF cannot provide the care required and must refer the beneficiary to a different organization. The EBC will require the referring MTF to purchase that care "regardless of whether that organization is another MTF, the MCSC, or an external civilian provider."[19] When an MTF purchases care, the cost will be based on whom they are purchasing the care from. If the care is purchased from another MTF the cost will be that MTFs incremental cost of providing that care. If the care is purchased from civilian sources such as the MCSC, the cost will be the Government's cost of the actual claim. Lastly, pharmaceuticals obtained by the MTFs enrollees will be charged the supply cost plus a standard dispensing fee.[20]

The selling of healthcare services refers to any services that the MTF provides for external customers of their MTF. External customers can include: other MTF or MCSC Prime enrollees, individuals in TRICARE Standard or Extra, Medicare customers, and all other individuals that are not the MTFs Prime enrollees. "The MTF will 'earn' revenue for care provided to external customers but must ensure that the TRICARE access standards and quality metrics are met for the MTF's TRICARE Prime enrollees."[21]

Phased Implementation and Data Integrity. The implementation of EBC began in October of 1997 and will be phased to allow MTF commanders and staffs the opportunity to identify, develop, operate, and

validate the data systems that will serve as the basis for EBC calculations. Historically, MTF commanders have indicated that their data was incomplete and inaccurate. Funding decisions will be based on EBC data within the next year and MTF commanders must ensure that they give data integrity a very high priority. As explained in the EBC Implementation Guide:

"When we have sufficient confidence that the data being collected and reported by our information systems is relatively accurate and timely across the MHS, then the actual dollars will flow based on EBC results. Some MTFs will accomplish this quicker and more fully than others and The Surgeons General have voiced their intent to include this in their evaluations of MTF commander performance."[22]

Commanders must ensure that they and their staffs focus on establishing and maintaining quality data integrity while maximizing the enrollment of their TRICARE Prime beneficiaries.

DHP Resource Allocation with EBC. The first two categories of DHP allocation, Military Medical Support and Military Unique Capitated will remain under the current capitation allocation model. The third category, HMO Equivalent, will be capitated based on the number of TRICARE Prime beneficiaries enrolled. The EBC formula for calculating total MTF Category 3 funding is:

"MTF Prime Enrollment Capitation Funds
+ Services Provided to Others' Prime Enrollees
+ MTF's Medicare allocation from parent Service
+ Other External Customer Services Provided
+ Military Service / MTF Special Funds
- Prime Enrollees Referred Out
= Total MTF Category 3 Funding"[23]

Category 3 also includes a wide variety of noncapitated costs. These may be shifted to capitated costs in the near future as a result of EBC to help MTF commanders account for *all* resources used by the beneficiary population.

This formula shows once again the importance of maximizing the enrollment of beneficiaries into the TRICARE Prime option. The PMPM funding in line one of the formula is based on enrollee equivalent lives. These equivalent lives are simply "enrolled prime beneficiaries adjusted for demographic factors to account for differences in healthcare requirements."[24] The demographic factors include: age, gender, beneficiary category, service affiliation, and marital status. Take, for example, a 34-year-old male who is in the Army and married. This individual has an equivalent lives factor of .53, assuming there are 1,000 other like individuals enrolled in TRICARE Prime at a specific MTF. Thus the total enrollee equivalent lives would be 530. Calculations of this type are computed to reflect every available demographic mix within the beneficiary population and then the aggregate equivalent lives value is multiplied times the facility's PMPM rate. The resultant figure is the enrollment budget or the MTF Prime enrollment capitation funding level for this MTF.

Health Management Information Systems. The criticality of data integrity becomes even more apparent with the advent of the Corporate Executive Information System (CEIS). The CEIS will calculate these enrollee equivalent lives and monthly reports will be forwarded to each MTF, Lead Agent, the Services, and HA. The MTF commanders must place an absolute premium on all aspects of data management. Unlike any time in the MHS history, EBC will create real changes (read reductions) in funding levels for MTFs that do not have quality data integrity.

An EBC enrollment scorecard has been developed to evaluate the MTF's performance. This scorecard will utilize the Defense Enrollment Eligibility Reporting System (DEERS) as the official source of MTF Prime enrollee counts. "CEIS will transform the raw enrollee data into equivalent lives to determine the differences between actual and projected equivalent lives for the MTF's scorecard."[25] The implementation of EBC is being phased in recognition of the current inadequacies with the MHS data integrity. "Although monthly EBC scorecards will compare target/budgeted enrollment, space-available, and care outside the facility to actual 'production,' the services will not adjust operations and maintenance allocations until after the mid-year budget execution review."[26]

In addition to CEIS and DEERS, a wide variety of powerful information systems will support the implementation of EBC. These systems include the: Composite Health Care System (CHCS), Retrospective Case Mix Analysis System, CHAMPUS Actuarial Projection System, Medical Expense Performance and Reporting Systems (MEPRS), Resource Analysis and Planning System, Catchment Area Billing Report, and the Defense Medical Information System.[27] These information systems must be appropriately utilized and carefully monitored through MTF command emphasis. "Mature and fully developed data systems that provide complete and

accurate information are the foundation that EBC is built upon."[28] This timely and accurate utilization of data for decision makers is the key to the success of EBC and ultimately the MHS.

Reconciliation. The reconciliation capability is probably the single biggest difference from the previous fund distribution schemes in the MHS. Reconciliation is simply a monthly accounting of the amount of healthcare purchased for an MTF's Prime enrollees and the care provided to external customers. This allows "the MTF's budget to change monthly based on how the MTF treats its Prime enrollees, where it sends them, and which external patients it treats."[29] Again, the information systems play the pivotal role. The CEIS will utilize the MEPRS price lists, DEERS, CHCS, Ambulatory Data System, and the MCSC information. Reconciliation is also the phase during which the EBC scorecard and enrollment reports are generated by CEIS. Yet again, the importance of data integrity and maximized enrollment is emphasized as the key to the successful utilization of EBC.

The Future of EBC. The future of EBC is tied very closely with enhanced data integrity and more powerful software utilization. The MEPRS will be upgraded to provide a higher level of detail, enabling a much more specific view of cost allocation. This upgrade combined with the full implementation and execution of the CEIS program will provide a much better basis for comparison than at any previous time in the MHS. The focus will be on improving the incentives for the MTF commanders to become more financially efficient in their delivery of care to the beneficiary population. Three changes in the future of EBC will provide significant improvements in the management of the healthcare for the MHS beneficiaries. First, reducing the portion of MTF overhead and increasing the incremental cost assigned to each patient service will further encourage MTF efficiency. Second, the direct correlation between the new TRICARE contract 3.0 and EBC. This version 3.0 continues the MHS's shift to a fully enrolled and capitated model. TRICARE 3.0 will provide more predictable risk to the contractor and help lower contract costs. Additionally, this contract will provide a reduction in bid price adjustments and allow the MTFs and Contractors to directly bill each other.

Conclusion

With today's dwindling resources and increased focus on the rising cost of healthcare, the MHS faces unprecedented challenges in the execution of its healthcare mission. "An important part of the solution to these problems is a revamped healthcare system where the incentives motivate everyone to pursue, or provide cost-effective, quality healthcare."[30] The EBC provides the MHS with the tools required to meet these challenges. With EBC, the MHS can dramatically improve the financial efficiency and effectiveness with which they deliver healthcare.

The full implementation of EBC is just one step, albeit a critical one, in preserving the future of the MHS. The MHS must demonstrate significant improvements in financial efficiency while providing documentable evidence of fully satisfied beneficiaries. These successes must then be effectively communicated to Congress; then and only then will the MHS survive.

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AMEDD Dateline

Dr Wayne R. Austerman†

1 Jul

Major Charles L. Kelly, MSC, was killed in action in the Republic of Viet Nam while flying on a medevac mission for American troops. His radio call sign, "Dustoff," was subsequently adopted as the descriptive term for all such missions. **(1964)**

Blood Transfusion Research Division was established at the U.S. Army Medical Research Laboratory, Fort Knox, KY. Army-sponsored, it became a tri-service institution and "a dominant scientific force in its field." **(1965)**

3 Jul

Newly appointed as commander of the Continental Army, General George Washington arrived at Cambridge, Massachusetts, to direct operations against the British force then under siege in Boston. Appalled by the lack of field hygiene and sanitation among the New England troops, he referred to them as "an exceedingly dirty and nasty people." **(1775)**

Three-day battle at Gettysburg, Pennsylvania ended. Union casualties totaled 3,155 KIA, 14,529 WIA, and 5,365 MIA. Confederate losses were 3,909 KIA, 18,735 WIA, and 5,425 MIA. **(1863)**

5 Jul

Twenty-year old Private Kenneth Shadrick of Wyoming, West Virginia, became the first American casualty of the Korean War when killed by machine gunfire from an enemy tank in the "Task Force Smith" engagement fought north of Osan, Republic of Korea. **(1950)**

Four days after the landing of the first U.S. Army combat units on the peninsula, 57 Army nurses arrived in Pusan, Republic of Korea, and were caring for patients within 24 hours. Within a year, 597 Army nurses were serving in Korea. **(1950)**

8 Jul

Colonel Malcom G. Grow, surgeon of the 8th U. S. Army Air Force, received the Legion of Merit for his work in developing an armored "flak jacket" for wear by air crewmen. His study of combat wounds established that 70% of such injuries were caused by comparatively low velocity shell fragments, which could be deflected by steel helmets and armored jackets. **(1943)**

9 Jul

The Nurse Corps (Female) was redesignated as the Army Nurse Corps by the Army Reorganization Act of 1918. Base pay for nurses was increased to $60 a month, the first such pay raise in nearly 20 years. **(1918)**

12 Jul

Confederate Major General Jubal Early led a major raid across the Potomac to threaten the defenses of Washington, DC. President Lincoln insisted on visiting the front lines of Union fortifications at Fort Stevens and came under enemy sniper fire. He consented to seek cover only after Surgeon Charles V. Crawford of the 102d Pennsylvania Volunteer Infantry was wounded by a sharpshooter while standing by his side. **(1864)**

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† Dr Austerman is the Historian, U.S. Army Medical Department Center and School, Fort Sam Houston, TX.

14 Jul — While on detached service with the British Royal Army Medical Corps at Arras, France, LTC Louis J. Genelba became the first AMEDD and American casualty of World War I when he was wounded by a German shellburst. **(1917)**

17 Jul — Congress authorized the extension of medical disability pensions to every "officer, seaman, or marine disabled in the line of duty." **(1862)**

22 Jul — The *USS Constitution* departed Boston harbor on an 11-month cruise against enemy shipping in the brief, undeclared naval conflict with revolutionary France. Among her supplies were 48,600 gallons of drinking water and 79,400 gallons of rum. Following several engagements and the capture of a number of enemy merchant ships, the *Constitution* returned to port in mid-1799 carrying 48,600 gallons of stagnant drinking water and 200,000 gallons of rum, which was believed to possess valuable medicinal qualities. **(1798)**

27 Jul — Continental Congress authorized creation of a "Hospital" or medical service for the Army, to be headed by a "Director General and Chief Physician." This marked the establishment of a U.S. Army Medical Department. Doctor Benjamin Church of Boston, Massachusetts, was appointed as senior physician of the new service, but was subsequently removed from office when exposed as a British spy. **(1775)**

2 Aug — Albert Woolson, last survivor of 2.2 million Union Civil War veterans, died at the age of 109 in Duluth, Minnesota. He was survived by Confederate veteran Walter Williams, who lived to reach the age of 117 before dying in December 1959. **(1956)**

3 Aug — Congress authorized The Surgeon General to employ women as nurses in Army Hospitals at a salary of $12 per month plus one ration per day. **(1861)**

5 Aug — Congress abolished flogging as a punishment in the U.S. Army. Abolished earlier on 16 May 1812, the practice had been reinstated on 2 March 1833, but was permanently abandoned as an officially sanctioned disciplinary measure 22 years later on the grounds that it was inhumane and injurious to the health of those under punishment. **(1861)**

6 Aug — Capping a 21-year legal struggle, the widow of MSG Robert Shumard began receiving death benefits from the Veterans Administration. Mrs Shumard had claimed that her husband's 1967 death stemmed from radiation exposure suffered while serving as a crewman on the B-29 Enola Gay, which dropped the first atomic bomb on Hiroshima, Japan, in August 1945. **(1988)**

16 Aug — Major Doris S. Frazier was selected at the first Army Nurse Corps officer to attend the resident course at the Command and General Staff College, Fort Leavenworth, KS. **(1967)**

An epidemic of diarrhea caused by poor rations contributed to the disastrous defeat of an American force by the British at Camden, SC. American killed, wounded, and captured totaled 2,000 men, while the British lost 325 out of 2,240 men engaged. **(1780)**

29 Aug — Union General John Pope's forces were defeated by Lee's Army of Northern Virginia at the Second Battle of Bull Run. A 2-week delay in clearing the battlefield of all surviving Union casualties sparked a Congressional investigation of the field medical support system. **(1862)**

31 Aug — Army Nurse Corps strength stood at 3,354 officers on active duty. **(1959)**

1 Sep — Two helicopters were assigned to Colonel D.E. Carle, division surgeon, 2d Infantry Division, for casualty evacuation from clearing stations to the 8076th MASH at Miryang, Republic of Korea. This marked the onset of dedicated aerial medevac operations during the Korean War. **(1950)**

14 Sep — Public Law 89-609 authorized the grade of Brigadier General for the Chief of the Medical Service Corps. **(1966)**

17 Sep — The Battle of Antietam in southern Maryland marked the bloodiest day in American history. Twelve hours of fighting generated nearly 24,000 Union and Confederate casualties. Medical Director Jonathan Letterman's recent comprehensive reorganization and reform of the Union field medical support system enabled it to cope efficiently with the unprecedented mass of wounded men. **(1862)**

20 Sep — Two days of combat on the banks of Chickamauga Creek in northern Georgia yielded 35,623 Union and Confederate casualties, which left the opposing armies' field medical support systems strained to the brink of collapse. **(1863)**

30 Sep — Public Law 898-609 authorized Regular Army commissions for male members of the Nurse Corps. **(1966)**

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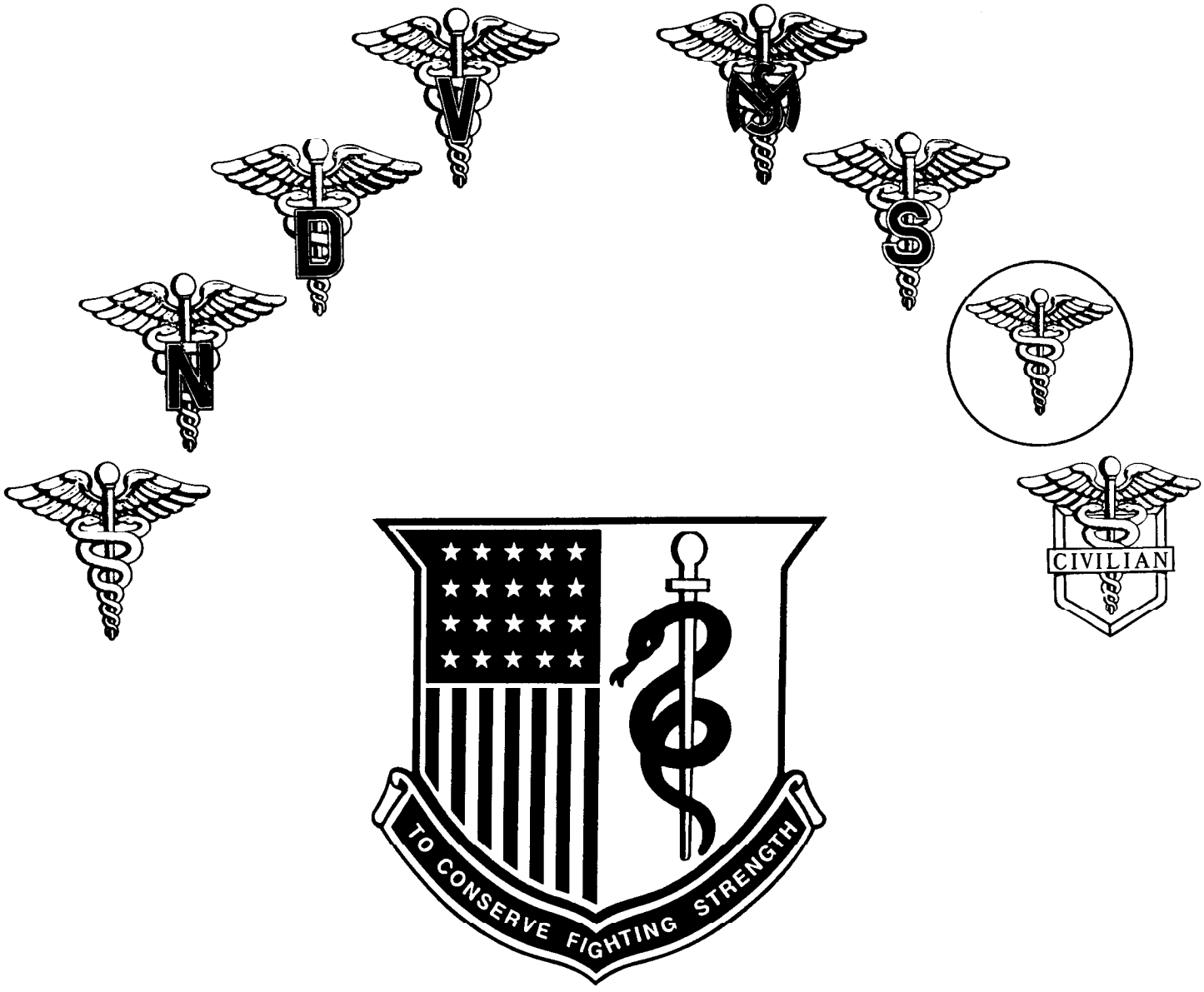
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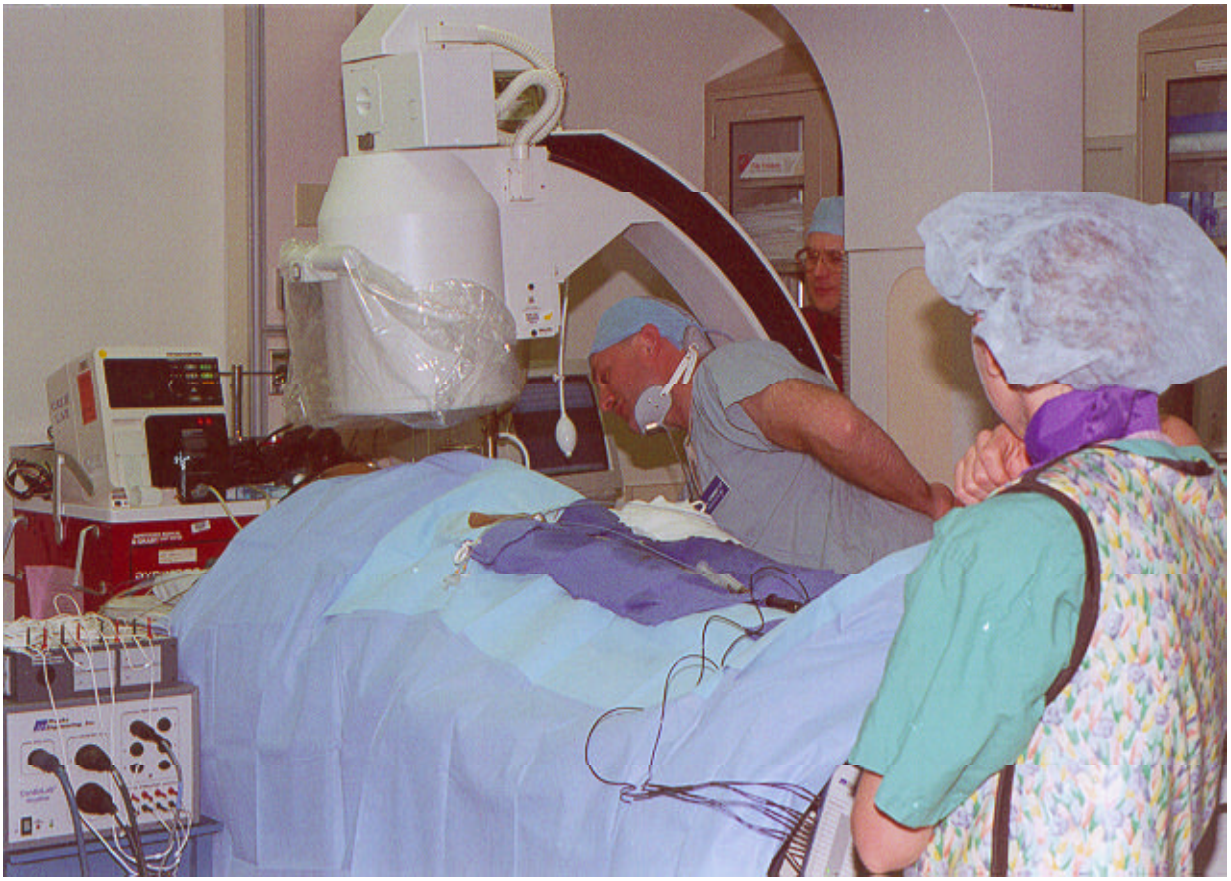


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